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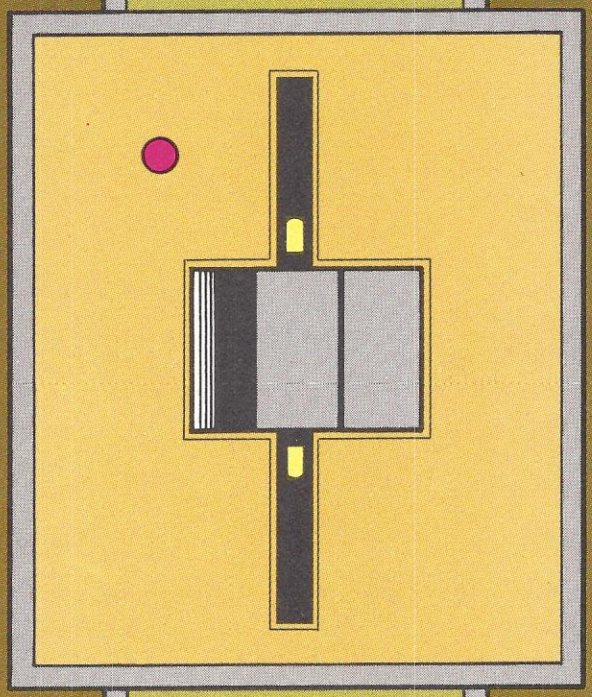

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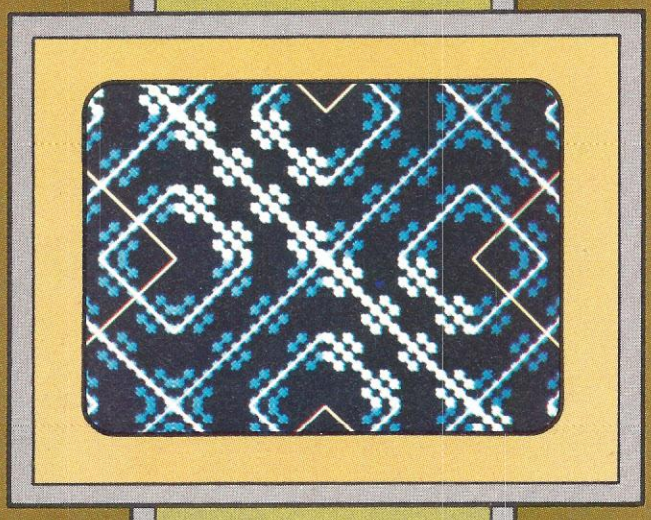

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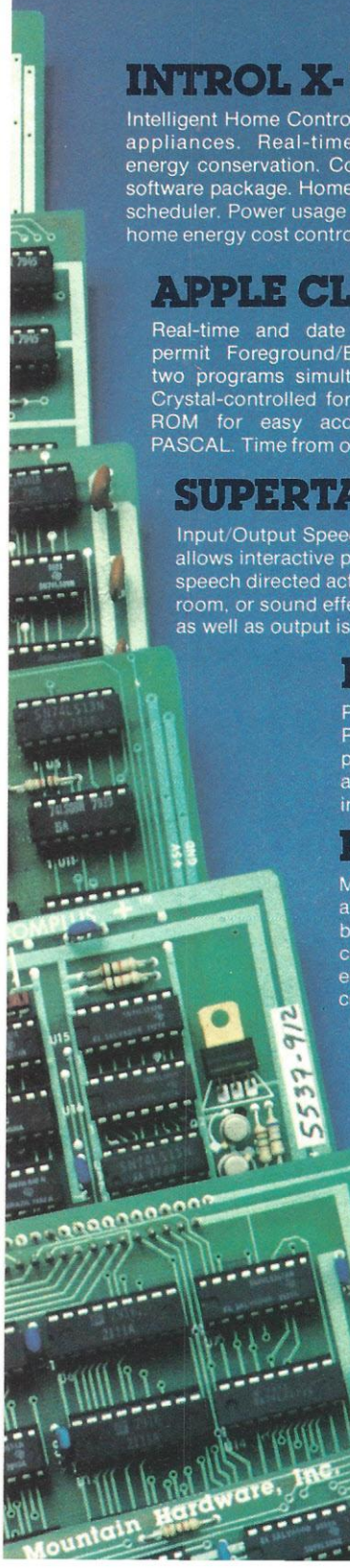

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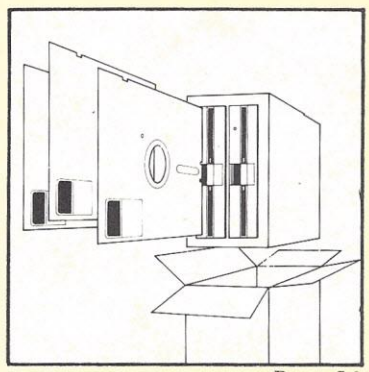
JUNE 1980 VOL. IV No. 6

Personal Computing

For Your Home and Business



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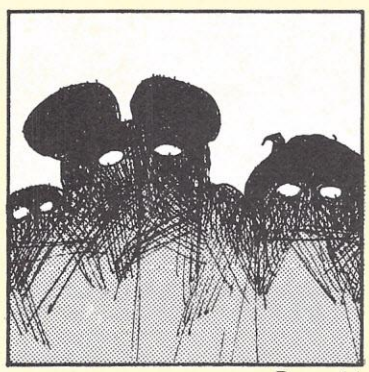

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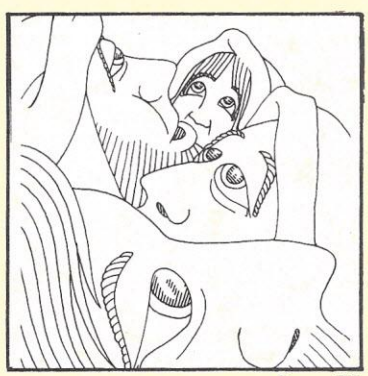

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DEPARTMENTS

SPECIAL REPORTS: DISK DRIVES and GRAPHICS

FEATURES

Publication Number ISSN 0192-5490

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CIRCLE 3

Personal Computing

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Publisher. Published monthly by Benwill Publishing Corp.: Harold G. Buchbinder, Chief Executive Officer; George Palken, President; Domenic A. Mucchetti, Treas. Executive; Editorial and Subscription Offices: 1050 Commonwealth Ave., Boston, MA 02215. Controlled Circulation postage paid at Long Prairie, MN. Membership in Audit Bureau of Circulation pending.

Subscription rates. U.S.: 1 year (12 issues) $14; 2 years (24 issues) $26; 3 years (36 issues) $38. Canada & Mexico: add $4/year for surface mail, $8/year for airmail. Other countries: add $8/year for surface mail, $36/year for airmail. Send subscription orders and address changes to: Circulation, Personal Computing, 1050 Commonwealth Ave., Boston, MA 02215. In Japan/Asia: K. Yanagihara, International Business Corp., 10-10 Shinjuku 3-chome, Shinjuku-ku, Tokyo 160, Japan; (03) 350-0272. In Europe: Personal Computing c/o LP Enterprises, 313 Kinston Road Ilford, Essex, Eng. IG1 1PJ tel: 01 553-1001. **Back Issues.** U.S.: $3. Canada & Mexico: $4. All other countries: $6.

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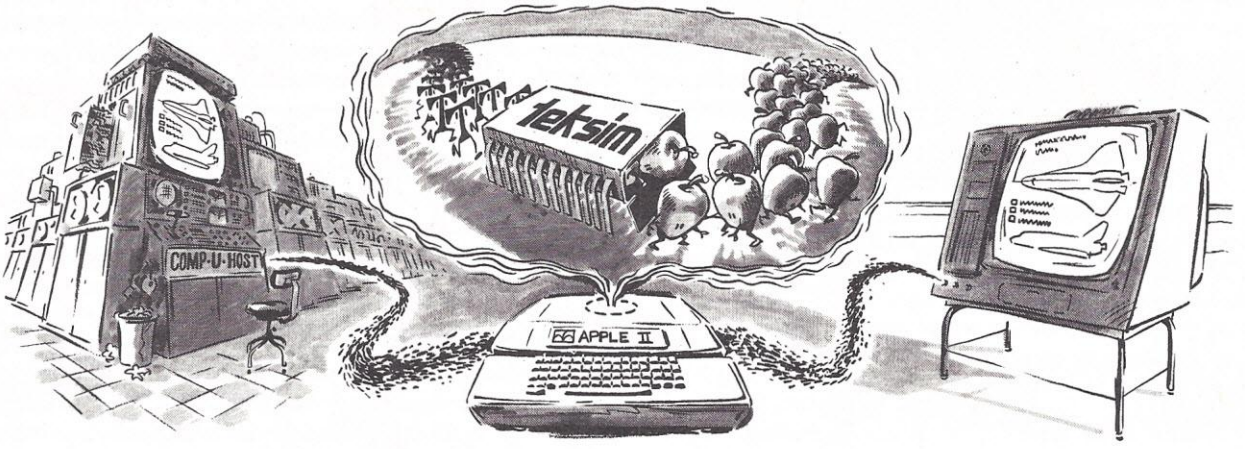

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CIRCLE 7

FEEDBACK

For/Next Loops and Faulty Formulas

Dear Editor:

I was very much interested in Tim Field's article in the March 1980 issue, "Calculating Interest/Principal Payments for Loans." I have a Sol/20 with 32K and a North Star Double Density Disk System.

I had no trouble entering and executing the program, but my answer did not quite agree with the Sample Run. Since I am fairly new with this microcomputer business, I assumed that I must have made an error.

I located similar programs in other books and journals and generally came up with the right answers.

After many hours I finally located the "bug". The program as written skips the 24th payment and prints the 25th payment. In line 580, eliminate K = K + 1 or use K = K. New line 580 reads Q = −(N − K + 1).

Ralph A. Ruscetta
Columbia, SC

Dear Editors:

Tim Field's article "Calculating Interest/Principal Payments for Loans" was very well written. There was, however, a large error in the formula printed for figuring the payment each period. The correct formula should be:

$$A = \frac{P*I(1+I)^n}{(1+I)^n-1}$$

The program listing, step 280, is correct and should calculate the correct answer.

Three more formulas that might be of interest to your readers are:

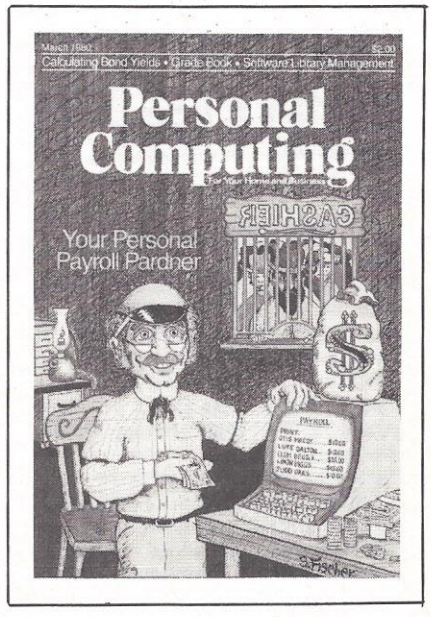
1. Remaining balance after payment k:

$$BAL(k) = A*\left[\frac{1-(1+I)^{(k-n)}}{I}\right]$$

2. Amount of a loan amortized from payments j through k inclusive:

$$AMORT(j,k) = BAL(j-1) - BAL(k)$$

3. Amount paid to interest by payments j through k inclusive:



$$INT(j,k) = (k-j-1)A - [BAL(j-1) - BAL(k)]$$

Alan R. Cobb
Captain, USAF
Fairfield, CA

Author's note: Mr. Ruscetta's problem seems to lie in the For/Next loop. It seems that his Basic implements this loop slightly differently than the implementation on my machine. Apparently, his Basic, when it reaches the end of the loop, increments the looping variable (K in my program) and then compares the variable with the maximum parameter value (N−1 in my program). If the looping variable is greater than the maximum value, the program falls through the loop. In my version of Basic, the looping variable is apparently compared with the maximum parameter value at the end of each loop and if the two are equal, the program falls through the loop. Thus, when Mr. Ruscetta ran the program on his computer, K was equal to (N−1)+1 or N. When my version falls through the loop, K = N−1. At that point, I needed to increment K to figure out the last payment, whereas Mr. Ruscetta did not need to increment. The sure way to fix this problem for any version of Basic is to change line 580 from K=K+1:Q=−(N−K+1) to K=N:Q=−(N−K+1). This change will assure that the final payment will be the Nth payment.

Captain Cobb's letter points out correctly that my formula presented in the text of the article is in error. As Captain Cobb points out, the program was written using the correct formula so the answers produced by the program are correct. However, the correct formula is the one Captain Cobb gives above.

I thank the two gentlemen for their comments. —*Tim Field*

Wine Tasting Improved

Editor:

In the January issue there was an article called "Host a Wine Tasting Party" by Robert C. Kyle. The article itself was fine and I was impressed with the idea of using my microcomputer for such a wine tasting party. However, the program that came with the article contained several errors and was inconsistent in the manner and techniques in which it was written. This forced me to rewrite the program and during this process I learned several tricks and shortened the program.

The first major problem was statements 235 and 236. As printed, line 235 is an IF statement that branches to 236; however, if the condition of the IF statement is not met it defaults to the next statement, which is also 236. This results in an endless loop. I solved this problem by combining the two statements and the result is seen in line 470 of my listing (Figure 1).

The second major problem is the waste of memory used by Kyle's program in lines 315 to 405, a total of 19 lines. In these lines the author used different variables to find the average of each wine and then stored the result in an array A(B). One example of these variables are K, K1, K2, K3, K4, K5, K6 and K7, each using two lines to perform the same function and then store the results in the same array. All of these separate variables can be replaced by a single array K(B). This reduces the number of lines from 19 to 2 as seen in lines 300 and 310.

The next fault I found was the misuse of subroutines. With the possible

exception of the subroutine 230 to 250, all other subroutines were better used directly as parts of the main program. This makes the program easier to understand and follow the flow. It also eliminates time wasted in the original program if you give the wrong name for the wine. In the original the program will ask for the name of the wine, then your name, check to see if you entered your name correctly, check to see if you entered the wine correctly, and if you did not it will require you to enter your name again, and check to see if you entered your name correctly, and then if you entered the correct wine. By making the checks part of the flow of the program you eliminate this repetition.

Two other points to be made concern IF statements and the use of INPUT statements. In Level II the IF statement can contain ELSE. This can be used to preserve memory as seen in my program in lines 150, 210 and 290. In Kyle's program half his statements are INPUT and the other half are PRINT: INPUT. They can all be INPUT statements as shown by comparing Kyle's statement 65 and my statement 110.

One final note. If you want to have people interact with the computer, use their language not the computer's. By making a variable into a string variable you can answer the computer with "yes" and "no" instead of "1" or "2". See Kyle's statement 155 and my statement 360.

Michael L. Keelean
Kennewick, WA

Author's note: 1. Mr. Keelean has the benefit of a printer, which at present I am not fortunate to own. Therefore in copying the program listing from the CRT and the notepad, errors are bound to happen. I am surprised that only the one mistake was found. Correct listing for line 235 is:

235 IF A1>4 OR B1>4 OR C1>7 OR D1>3 OR E1>2 THEN 236 ELSE GOTO 240

2. Since the program used only a little over 90 lines and I had 16K of memory at my disposal, I was not about to start looking for memory conservation. At the end of each program I enter, I ask for a memory printout. It is my rule of thumb that any program leaving less than 5K of memory needs some polishing. This particular program left over 9K of memory so I left it as is. Using the single array is a good idea, not only from the aspect of memory conservation but less time in entry accompanied by less chance of entry errors. But isn't that a part of *Personal Computing's* purpose in printing these programs? Mr. Keelean, in modifying my program, not only has advanced his own program techniques but also those of other readers.

3. Use of subroutines is at the discretion of the programmer. I can understand Mr. Keelean's discomfort in trying to follow the logic of the program with all the subroutines. Yet I ask his understanding (and future appre-

Figure 1

```
10 '      *INTRO TO PROGRAM AND INITIALIZATION OF VARITABLES*
20 CLS:PRINTTAB(15)CHR$(23)"WINE TASTING"
30 PRINT"WELCOME TO THE BON'S COLUMBIA  ROOM WINE TASTING PARTY.  YOU  ARE INV
ITED TO TASTE EACH WINE  AND THEN SCORE IT ACCORDING TO  ITS AROMA, BOUQUET, FLAV
OR, BODY, AND FINISH.  I WILL RATE EACH  WINE ACCORDING TO YOUR SCORE."
40 PRINT" + + THANK YOU FOR COMING + +"
50 PRINT"    * * ENJOY YOURSELF * *
60 CLEAR 1000:DIM A$(12),W$(8),A(8),K(8),L(8)
70 '             ***** START OF PROGRAM ****
80 INPUT"HOW MANY PEOPLE ARE ATTENDING";N
90  FOR I=1 TO N: INPUT"ENTER YOUR NAME PLEASE";A$(I): NEXT I
100 INPUT"HOW MANY WINES ARE YOU TASTING TONIGHT";P
110  FOR B=1 TO P: INPUT"PLEASE ENTER NAME OF EACH WINE";W$(B):     NEXT B
120 CLS:PRINT STRING$(23,"*");" WINE SCORE SHEET ";STRING$(23,"*")
130 INPUT"PLEASE ENTER THE NAME OF THE WINE YOU HAVE TASTED";T$
140 '             **** CHECK FOR RIGHT NAME OF WINE ****
150  FOR B=1 TO P: IFT$=W$(B)THEN 190  ELSE NEXT B
160 INPUT"WINE IS NOT FILED IN MY MEMORY AS YOU JUST ENTERED IT.    PRESS ENTER
TO SEE CORRECT LISTING";C
170  FOR B=1 TO P:  PRINTW$(B):  NEXT B:  GOTO 130
180 '                  **** END OF CHECK OF WINE ****
190 INPUT"WHO IS SCORING THE WINE";B$
200 '          **** CHECK FOR RIGHT NAME OF PARTICIPANT ****
210  FOR I=1 TO N:  IF B$=A$(I) THEN 250  ELSE NEXTI
220 INPUT"ENTER YOUR NAME AS YOU DID EARLIER - PRESS ENTER TO SEE GUEST LIST";C
230  FOR I=1 TO N:  PRINTA$(I):  NEXT I:  GOTO 190
240 '                  **** END OF CHECK OF NAMES ****
250 GOSUB420
260 PRINTB$;", YOU SCORED";S1;"FOR ";T$
270 '                  **** AVERAGING SCORES ****
280 INPUT"I WISH TO ADD YOUR DATA TO MY FILES.  PLEASE PRESS ENTER";C
290  FOR B=1 TO P:  IF T$=W$(B) THEN 300  ELSE NEXT B
300 K(B)=K(B)+1:L(B)=L(B)+S1:A(B)=L(B)/K(B)
310 PRINT"GRAND AVERAGE FOR ";T$;" IS";A(B)
320 INPUT"WOULD YOU LIKE TO CONTINUE SCORING WINE";Y$
330 IF Y$="YES" THEN 120
340 CLS: PRINTCHR$(23);"WINE","RATING"
350  FOR B=1 TO P: PRINTW$(B),A(B): NEXT B
360 INPUT"HAVE ALL WINES BEEN TASTED AND  SCORES ENTERED";Y$
370 IF Y$="NO" THEN 120
380 PRINTTAB(5)"THANK YOU FOR COMING"
390 PRINT"    * * GOOD DRINKING * *"
400 END:'      ####!!!! END OF MAIN PROGRAM !!!!####
410 '      ********** SCORING SUBROUTINE **********
420 INPUT"WHAT IS THE SCORE FOR AROMA (4 POINTS MAX!)";A1
430 INPUT"WHAT IS THE SCORE FOR BOUQUET (4 POINTS MAX!)";B1
440 INPUT"WHAT IS THE SCORE FOR FLAVOR (7 POINTS MAX!)";C1
450 INPUT"WHAT IS THE SCORE FOR BODY (3 POINTS MAX!)";D1
460 INPUT"WHAT IS THE SCORE FOR FINISH (2 POINTS MAX!)";E1
470 IF A1>4 OR B1>4 OR C1>7 OR D1>3 OR E1>2 THEN PRINT"ERROR IN SCORING.  TRY AGA
IN.":GOTO 420
480 S1=A1+B1+C1+D1+E1:M=10/S1
490 IF M>=.8 PRINT"NOT VERY GOOD MARKS FOR THIS WINE... SORRY ABOUT THAT!"
500 IF M<.8 AND M>=.7 PRINT"NOT BAD! THERE ARE WINES THAT ARE WORST."
510 IF M<.7 AND M>=.6 PRINT"NICE LITTLE WINE.  GOOD FOR EVERYDAY DRINKING."
520 IF M<.6 PRINT"* * EXCELLENT SCORE * * SHOULD BE IN YOUR WINE CELLAR!!"
```

ciation) in realizing that persons not "comfortable" with computers and also under the influence of an alcoholic beverage have very short memories. Towards the end of the tasting I found that 60% of the guests had to check the guest list to see how they had entered their name into the computer. The same applied to the wine list. It is not that my guests were "drunk" beyond normal functioning; it is hard to remember exactly how a wine or a name was originally entered. I know there are some string manipulations that will handle a "JOHN R. JONES" or a "J. R. JONES" or a "J. JONES" all as the same string, but that would take too much memory and I found it easier to use a subroutine to *politely* direct the person to make the correct entry.

4. The use of PRINT xxxxxx:INPUT xxx or just INPUTxxxxxx is at the discretion of the programmer. As you can see I used both methods in the program. Looking back at my notes and flowcharts I can't see why I did use the PRINT:INPUT statements. Mr. Keelean's point is well taken.

In summary I would like to thank Mr. Keelean for finding my one mistake on line 235. Since I am using my program about once a month and it functions perfectly, I did not take the time to thoroughly check the published listing. This is not the fault of *Personal Computing*. I inadvertently omitted the ELSE statement.

I appreciate Mr. Keelean's informing the rest of us about his modifications. Though they will conserve memory they do little in making the program function any better or worse.

— Robert Kyle

Compucolor Correspondence

Editors:

It was surely good to see a program written for Compucolor (Patrick Seslar's "TV Typist", January 1980) — even a pre-Compucolor II model. He mentioned the location of the output status word (-24918) and it was like a refreshing breeze. I'm not alone in my Compucolor ownership.

Would you publish my address so that other Compucolor users may write me?

Dwight K. Solomon
Small Computer Systems
4450 Trinity Ave.
Salt Lake City, UT 84120

Satisfying Service

Dear Editors:

I believe when companies give extra service to their customers that they need to be commended for it. I am writing to make such a commendation about a company: C & H Micro. I believe my association with this company should be told to your readers. Don't your readers deserve to know about super companies who will make their mail order buying a pleasure?

I purchased C & H Micro's Textpage. I had some difficulty with it and wrote to them, expecting a letter in return. Much to my surprise they called long distance with changes to make in the program. Also, they followed up the telephone call with further information and documentaion.

This company has a refreshing attitude and I'll certainly continue to do business with them. I hope with this recommendation your readers will do the same.

Robert B. Reese, D.D.S.
Austin, Texas

Spelling Counts

Dear Friends:

Dare I make a comment to one of your letter writers, Mr. Paul G. Fox of Bethlehem, PA (March 1980 *PC*)? I agree with his attitude of concern that too many equate intelligence and computers.

Take heart, Paul. In the five months since I acquired a microcomputer, I have read many magazines and many more programs. The machines may have a certain intelligence but I will not be concerned that they are going to solve the world's problems until they demonstrate an ability to spell.

James J. Kelly
Austin, TX

Read Carefully

Dear Editor:

If any of your readers are thinking about hanging a dot-matrix line printer onto their microcomputer system, I have a friendly warning to pass on to them: pay close attention to your manufacturer's recommendations, or know the risk you're taking if you ignore them.

For example, North Star recommends the Anadex DP-8000 connected to the parallel interface of their horizon. But comparing printer specs, I chose to save a few bucks by building a Heath H14 line printer for the serial interface.

I saved some money at $625 plus shipping plus an additional $82.98 at Heathkit Electronic Center in Seattle when the H14 flunked its initial power-on tests. They replaced two defective CMOS IC's and repaired three open foil breaks in the five volt supply on the PC board at no charge, but they detected erroneous installation of seven transistors. (Considering the obvious textual errors in the documentation, which would you believe — the text, or the pictorials? I guessed wrong and followed the pictorial. Customer error!)

My WH14 printer tested perfectly at 4800 baud under HDOS in Seattle. It went ape at 4800 baud on the Horizon after I got it home. A quick phone call to my friendly Horizon dealer divulged the fact that North Star DOS does not test for handshaking signals! (The Heath manual advises to run no faster than 110 baud without handshaking.)

So now I have a 110 baud line printer dawdling along while the 4MHz Z-80A and I are twiddling our respective thumbs! Does anybody out there want to trade an in-warranty Anadex DP-8000 printer for an in-warranty Heath WH14 plus some extra cash?

John F. Dye
4807 Fifteenth Ave. S.E.
Lacey, WA 98503
(206) 491-7412

Shell-Metzner Sort

Dear Editor:

In your January 1980 edition you published an article on various sort routines. I would like to mention the Shell-Metzner sort since it is the fastest sort I have found so far. Figure 2 shows a bubble sort and the Shell-Metzner Basic in Basic for the TRS-80. The sort table shows the time to sort comparisons. The Shell-Metzner doesn't save much time for less than 50 values but for more than 50, the saving is remarkable.

I'm not a computer scientist and can't explain why it's so much faster but it is and should be in everybody's repertoire. I checked inverted and nearly sorted lists and found that Shell-Metzner works with them too.

John L. Montgomery
Huntsville, AL

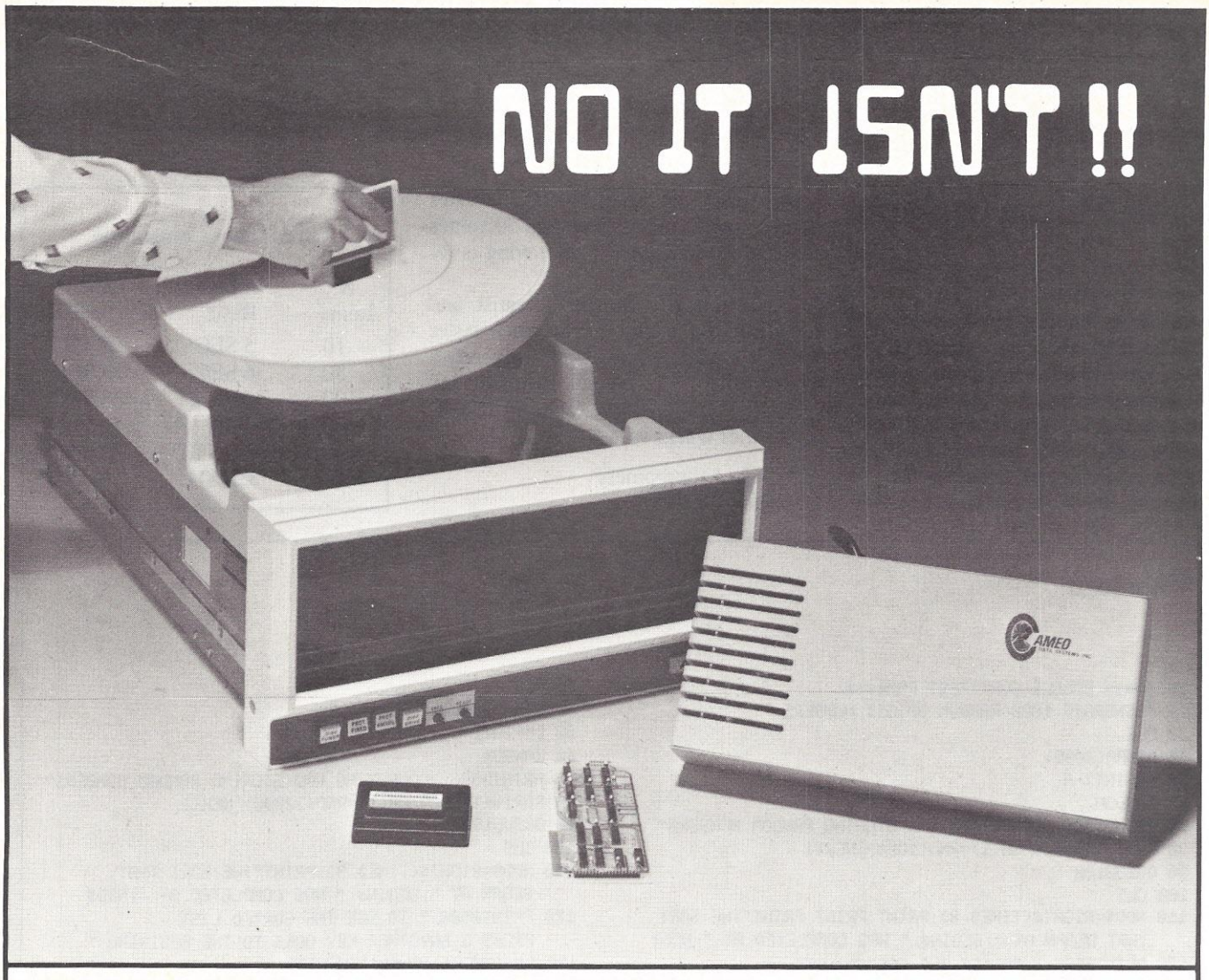
Sort Times Comparison

N Items	Bubble Basic	Shell Basic
10	5 SEC	5 SEC
50	36 SEC	13 SEC
100	2 MIN 28	28 SEC
200	9 MIN 13	1 MIN 4
500	59 MIN 31	3 MIN 5
1000	3:52:04	7 MIN 37

Figure 2

```
10 '**** BUBBLE SORT TEST PGM****
20 'GENERATE 1000 RANDOM 5DIGIT NUMBERS
30 CLS
40 DIMAA(3000)
50 DEFINTI-N
60 RANDOM
70 PRINT@586,"COMPUTING AND STORING RANDOM NUMBERS"
80 FORI=1TO1000:AA(I)=RND(1000):NEXTI
90 GOSUB180
100 CLS
110 NDD$=RIGHT$(TIME$,8):PRINT:PRINT:PRINT"THE SORT
    THAT BEGAN AT ";BEGIN$;" WAS COMPLETED AT ";NDD$
120 PRINT@586," TO SEE THE SORTED LIST
    PRESS G TO RETURN TO BEGINING PRESS B"
130 L$=INKEY$:IFL$=""THEN130
140 IFL$="B"THEN GOTO30
150 FORI=1TO N STEP 5:PRINTAA(I);"  ";AA(I+1);"
    ";AA(I+2);"  ";AA(I+3);"  ";AA(I+4)
160 NEXTI
170 END
180 INPUT"ENTER THE NUMBER OF ITEMS TO BE SORTED";
    N:BEGIN$=RIGHT$(TIME$,8)
190 PRINT"BEGIN TIME";BEGIN$
200 'SORT STARTS HERE
210 I=N-1
215 FLAG=1
220 FORJ=1TOI
225 IF FLAG=1THEN FLAG=0ELSE RETURN
230 K=N-J
240 FOR L=1 TO K
250 IFAA(L)<=AA(L+1)THEN290
260 TEMP=AA(L)
270 AA(L)=AA(L+1)
280 AA(L+1)=TEMP
285 FLAG=1
290 NEXTL
300 NEXTJ
310 RETURN


10 '**** SHELL 'SUPER' SORT TEST PGM ****
20 'GENERATE 1000 RANDOM 5DIGIT NUMBERS
30 CLS
40 DIMAA(3000)
50 DEFINTI-N
60 RANDOM
70 PRINT@586,"COMPUTING AND STORING RANDOM NUMBERS"
80 FORI=1TO1000:AA(I)=RND(32000):NEXTI
90 GOSUB180
100 CLS
110 NDD$=RIGHT$(TIME$,8):PRINT"THE SORT THAT
    BEGAN AT ";BEGIN$;" WAS COMPLETED AT ";NDD$
120 PRINT@586," TO SEE THE SORTED LIST
    PRESS G ANYOTHER KEY GOES TO THE BEGINING "
130 L$=INKEY$:IFL$=""THEN130
140 IFL$="G"THEN150  ELSE30
150 FORI=1TONITEMS STEP5:PRINTAA(I);"
    ";AA(I+1);"  ";AA(I+2);"  ";AA(I+3);"  ";AA(I+4)
160 NEXTI
170 END
180 INPUT"ENTER THE NUMBER OF ITEMS TO BE SORTED";
    NITEMS:BEGIN$=RIGHT$(TIME$,8)
190 PRINT"BEGIN TIME";BEGIN$
200 'SORT STARTS HERE
210 IDIST=4
220 'CONTINUE
230 IFIDIST>NITEMSTHEN260
240 IDIST=IDIST*2:GOTO220
250 'CONTINUE
260 IDIST=IDIST-1
270 'CONTINUE
280 IDIST=IDIST/2
290 IF IDIST<1THEN RETURN
300 NDIST=NITEMS-IDIST
310 FORK=1TONDIST
320 I=K
330 'CONTINUE
340 IFAA(I)<=AA(I+IDIST)THEN380
350 A=AA(I)
360 AA(I)=AA(I+IDIST)
370 AA(I+IDIST)=A:I=I-IDIST:IFI>=1THEN330
380 NEXTK:'CONTINUE
390 GOTO270
400 END
```



NOT ANYMORE!

No this isn't a "Hard Disk". We used to call it that, sometimes. But somebody muddied the water.

"Hard Disk", unfortunately, now calls something else to mind. That little bitty guy with no backup capability and no way of switching media? It's a "Hard Disk" to work with, all right, in business applications. Some even say "Impossible Disk".

We'd like to avoid confusion between our Cameo database solution and the one that doesn't work so well. The Cameo DC-500 subsystem employs a decade-proven **cartridge** disk. Our backup capability is built in, and takes four minutes. The ability to switch applications (by exchanging the removable cartridge) means you can use your computer for more kinds of work. A ten megabyte (5 fixed + 5 removable) subsystem costs $5995, for your **TRS-80* (Mod. I or II), Apple*, or S-100** computer.

So call **us** "The **Cartridge Disk** Guys", please, and call us soon. We'll show you the **really** cost-effective solution to microcomputer database storage.

CAMEO DATA SYSTEMS INC.
1626 CLEMENTINE ANAHEIM, CA 92802
(714) 535-1682

* TRS-80 is a registered trademark of the Tandy Corp. *Apple is a registered trademark of Apple Corp.

CIRCLE 8

RANDOM ACCESS

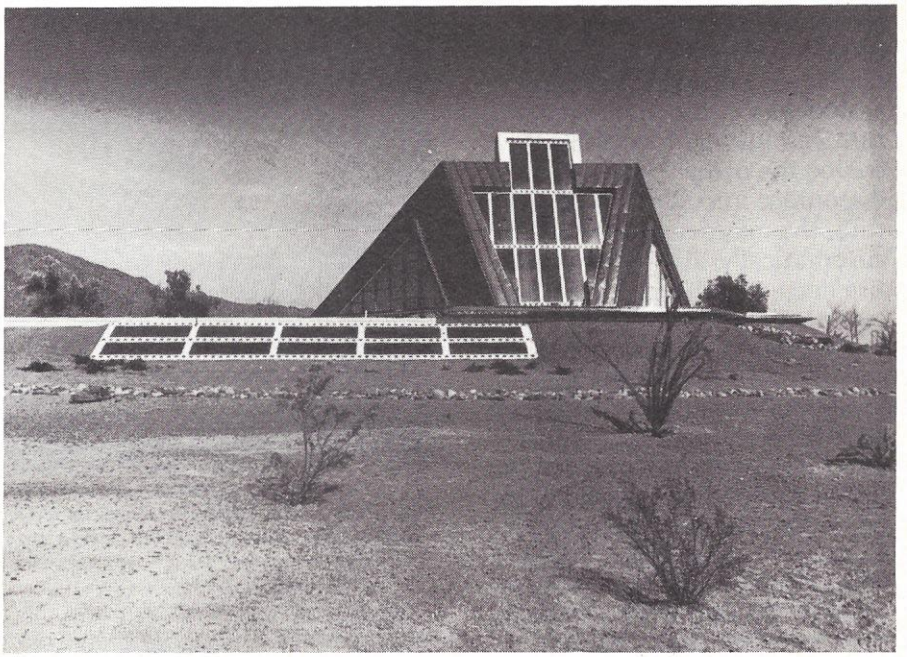
Home of the Future

The newly opened "House of the Future" at Ahwatukee in Arizona features a unique home management computer system that was designed and built by Motorola's Semiconductor Group.

"The Ahwatukee project is an exciting demonstration of the many advantages that microcomputer technology will provide for all homeowners in the near future," said Charles E. Thompson, Vice President and Director of World Marketing. "Since we were closely involved in the project from its inception, and the electronics requirements were given major consideration when design and construction decisions were made, we believe the Ahwatukee home to be the most electronically-sophisticated dwelling ever built."

Thompson said that the philosophy on which the system is based is that a home microcomputer system should make life simpler, more comfortable, add new capabilitites to the home, and be as responsive to the particular needs of the homeowner as possible.

The system features five Motorola-produced microcomputers, linked together to perform a number of important home management functions, including electrical load switching, energy conservation, environmental control, security, and information storage and retrieval. The homeowner can communicate with the microcomputer system, and program it to perform desired management functions, through an input keyboard device. The system also includes a number of TV monitors, closed circuit television cameras, temperature and humidity sensors and motion detectors.



Design of the Ahwatukee House includes solar collectors to heat the home and supply hot water. The sun also lights the home through several skylights.

The electrical load switching capability allows the microcomputer system to control lights, wall outlets and other electrical equipment in the home, in order to conserve energy and "even out" the usage of electricity within the home.

While all lighting in the home can be controlled from wall switches, the homeowner can elect to have them microcomputer managed. All lights can be programmed to turn on or off at various times of day or night. Or, to make it even simpler, the system can use the installed motion detectors to turn the lights on when people enter a room, and turn them off again when they leave.

The environmental control function of the system will also serve to reduce energy consumption, while at the same time assuring comfort in the home. The Motorola system will not only decide when to heat or cool different areas in the home, but it will also decide how to do it. It will always accomplish the task by selecting the least expensive means, said Motorola. For example, if it senses that the central part of the home has become too warm, the microcomputer will first check the outside temperature to determine whether doors and windows should be opened to let cooler air inside. If that's the appropriate solution, the system will automatically open the right doors and windows. If the outside air is too warm, the microcomputer may elect to turn on the evaporative cooler, but only after determining the humidity level in the air. If the air proves to be too humid to make evaporative cooling effective, the microcomputer will then turn on the central air conditioning system.

The environmental system also includes a thermostat setback feature. Different temperatures can be maintained in specific areas at different times of the day or different days of the week. The areas can be heated or cooled only when desired, which will further conserve electrical energy.

continued

Another important function is security. By monitoring smoke and motion detectors located throughout the home, the microcomputer can alert the homeowner to fires or intruders by sounding alarms or turning on the lights. The microcomputer system can also automatically turn various lights on and off during the owner's absence to discourage intruders. In the future, the microcomputer will automatically dial the police or fire department and deliver a prerecorded message.

The security function will also control the doors of the home. Traditional door locks and keys have been replaced by an electronic keypad, similar to the one found on hand-held calculators. When the proper access code is entered on the keypad, the door will automatically open. Repairmen or service people can be issued an access code that will only be valid at a certain time on a certain day of the week. As many access codes as the owner desires can be entered into the microcomputer system, and used as space-age "keys" to the home.

The same microcomputer system can provide informational storage and retrieval system for the homeowner. It can store income tax information, check book or savings account data, educational or instructional material, or even the weekly grocery list, to be retrieved and displayed on the TV monitor whenever the homeowner wishes. The microcomputer can also be used to keep track of appointments or meetings, displaying them on the TV monitor on the appropriate day.

The system notifies occupants if an alarm condition exists. The display is shown on a TV receiver with a Motorola EXORdisk II on top.

Thompson said that other electronic functions will be added to the microcomputer system as they are developed. For example, just before the "House of the Future" was completed, Motorola engineers added a voice capability to the system. The microcomputer is now able to greet members of the family by name as they enter the home (providing they entered the right access code in the front door keypad). It can announce the correct time on the hour, if the homeowner desires, and it can be programmed to provide the homeowner with verbal warnings in the event of fire or intrusion.

"We believe that the Ahwatukee home will play an important role in the development of future consumer electronics products," Thompson said. "I think we are demonstrating to the entire electronics industry what can be accomplished by applying creative applications engineering to today's state-of-the-art microcomputer technology. As we learn how to add more and more functions to the system at lower and lower costs, there is no doubt in my mind that centralized home microcomputer systems will soon become a standard feature in even moderately-priced homes, just as heating systems are standard today."

New Computer Center Seeks Software

A developing computer-based learning center in Texas needs your help. Still in the planning stages, the center, which hopes to expand nationwide, is looking for support in the form of market analysis and educational software.

Organizer Mark Cornell says the center needs surveys or studies that substantiate the need for education in the areas of computer literacy and basic skills learning. The center is particularly interested in language arts, reading and arithmetic for kindergarten through high school, along with adult remedial training; for example, skills needed to pass a General Educational Development exam for receiving a high school equivalency diploma.

Cornell says they also need outstanding tutorial software to teach those basic skills.

Cornell mailed out 400 inquiries to institutions and individuals. To date, he has received 45 replies, four of which produced significant documentation. The most valuable contributions came from the National Science Foundation and the Northwest Regional Educational Laboratory.

As the center plans on using Apple computers in a network system, all software should be suitable for Apple use.

"We're going to have to start out small," said Cornell, "and as the community builds up a desire for training, then we can add on to the network."

The first center will be located in central Texas, said Cornell. "Our anticipation is to duplicate it and then offer it nationally as a franchise," he explained.

Cornell stressed the center's need for outstanding tutorial software for the Apple, along with market analysis and related information.

For more information contact Mark Cornell at 1700 Halbert Street, Killeen, TX 76541; (817) 634-2892.

Homebound Programmers Back to Work with Plato

At home, behind closed doors, a previously untapped and ignored reservoir of skills has been discovered by Control Data Corporation.

What makes the discovery particularly exciting, according to company officials, is that the talents lie in persons with years of experience and expertise that would otherwise be lost.

Under a program entitled Homework, persons who have had to leave their Control Data jobs because of medical disability now are being trained and re-employed in a variety of capacities. Although they never leave their homes, the employees use Control Data's Plato computer-based education system first to learn programming and related skills, and then use those skills in developing new application software and educational courseware for the Plato system.

Control Data recognized the frustrations experienced by employees suddenly out of jobs for medical reasons. In search of a positive solution, the company created a task force to look into ways of putting back to work those employees disabled by injury or illness. Homework was the result.

Besides benefiting the employee, the program benefits the company by making use of the expertise often developed at company expense.

In the fall of 1978, Plato terminals were installed in the homes of 10 employees in the initial phase of the Homework program.

Persons with skills ranging from secretarial to managerial and whose disabilities ranged from heart disease to paralysis agreed to use the Plato terminal.

Each home terminal was linked with a large-scale Plato computer via telephone lines. The Plato terminals became the employees' link not only with educational materials but also with others in the project, with supervisors and with other users.

Plato terminal communications capabilities enable homebound staffers to attend "staff meetings" several times each month at the terminal. Questions and answers, assignments, interpretations and project-related status updates can be shared as users get to know one another and, in the process, ease some of the isolation disabled people feel.

The Plato terminal is the primary instructor which, together with text materials, helps trainees proceed at their own pace through modules of lessons.

This self-paced feature permits homebound workers to spend whatever time they have — depending upon their physical condition — in completing training.

Two employees have resumed full-time employment with Control Data. Other alternatives are being pursued for the other eight, according to K. L. Anderson, program manager for Homework. The first Homework group focused primarily on courseware development for the Plato system. A second group is learning business applications programming. A third is being trained to act as subject matter experts with the Control Data Institute network.

"As we become more sophisticated with Homework," Anderson said, "we will be able to take persons with special skills and let each have a choice of job-training possibilities."

Helen Flack, program coordinator, said Homework helps combat depression about loss of job status that occurs when a person becomes disabled and is forced into confinement.

Eventually, company officials see the concept extending to the able-bodied population as well. There are many jobs that could be done from home, especially in light of the energy situation, officials said.

Computer Crime Growing, Hard to Control

Losses due to computer-related crimes are estimated to be between $100 and $300 million per year, according to the U. S. Chamber of Commerce and SRI International.

"No one knows the actual extent of the losses," says Donn Parker, senior management systems consultant at SRI and a leading expert on computer crime. "The 700 cases SRI has studied probably represent only the tip of the iceberg."

The first definitive document designed to aid investigators and prosecutors in dealing with computer-related crimes has been produced by SRI. It is the Criminal Justice Resource Manual on Computer Crime. It was developed by SRI as a U.S. Dept. of Justice, Law Enforcement Assistance Administration publication. It is the first major step toward laying a foundation of knowledge of the techniques used to commit computer crimes and of the most viable means to detect, prosecute and deter them.

"In terms of ethical conduct," reflects Mr. Parker, "we are dealing with the same illegal activities, called fraud, theft, embezzlement, sabotage, espionage, invasion of privacy, which constitute business, economic and white-collar crimes. "However," he adds, "once a computer is involved it's an altogether new form of crime."

This form has spawned criminals with new methods, targets and timing, over unlimited geographical boundaries.

For law enforcement authorities, auditors and computer systems managers, it has resulted in new and more serious problems.

continued

Criminals may now be found among computer operators, programmers, tape librarians and electronic engineers. Their methods are as new as the jargon which has arisen to describe them. These include: salami techniques (small amounts of money sliced from large accounts), Trojan horses (hiding secret codes in someone else's computer program), data diddling, superzapping and logic bombs.

Targets of computer crime include new forms of money — electronic money — stored in electronic signals and magnetic patterns and transmitted over telephone lines.

Geographical constraints no longer inhibit these crimes. A telephone with a terminal attached can be used to engage an on-line system in any part of the world.

It is almost impossible to catch the performance of the act. An illegal use of a credit card could take place in minutes. The same act could be executed on a computer in less than .003 of a second.

"Unfortunately, folk heroes have been made of some computer criminals, in the Robin Hood mold," says Mr. Parker. "While investigative experience is increasing rapidly, with hundreds of cases being prosecuted, prevention is the answer in the long run. And that hinges on developing ethical standards that address the uses of computer technology and on confronting computer technologists with the criminality of their acts."

The growing incidence of crime involving computers reflects the proliferation of computers in all segments of business and government, and in society at large. The computer is rapidly becoming the account book and vault of both individuals and organizations.

The Criminal Justice Resource manual follows the disposition of computer crimes, from methods of detection through case development and prosecution citing applicable laws and existing statutes. Included in the manual is an overview of technology which prepares the lay person to determine when technical expertise should be used and how to interact with those who provide it, said SRI.

Of equal importance to management and computer manufacturers, the manual details the development of computer security programs and provides guidelines to trace system vulnerabilities, said SRI. Security has become a selling point to customers. IBM recently ran a full page ad in the Wall Street Journal to inform its customers of the safeguards it had developed.

The resource manual is available for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington D.C. 20402, Stock #027-000-00870-4.

"You *promised* you wouldn't get started with Fred over floppies vs hard disks!"

Buck Rogers Rides With Color Graphics System

One of the biggest stars of the TV program "Buck Rogers in the 25th Century" hasn't spoken a line of dialogue — and never will!

According to Bud Elam, special effects engineering consultant and program manager, a Ramtek computer graphics and imaging display system helps to enhance the show's visual effects for viewers and adds realism to the production. The software was developed by consultants Ken Dozier and Larry Luther.

"The color graphics system has a variety of applications. For example, we use it to create futuristic radar screens which provide information to the crew in the "Thunder Fighter's" cockpit. We also can produce structural diagrams of ships, the display of planets and the topographical mapping of the planets. The doctor in the series also uses the graphics system to show CAT scans of patients' hearts and brains," Elam said.

The special effects are created by a Ramtek 3300 stand-alone graphics system which can display up to 4096 colors. A digitizing tablet, a color camera and control unit, and an alphanumeric display terminal are also used with the system.

"All the pieces of equipment complement each other very well," Elam noted. "If we want to show a ship flying through space, for instance, we produce the special effect in the following manner: First, an artist's sketch is traced on the digitizing pad. This image is automatically produced on the Ramtek display screen simultaneously. A video tape machine records what is displayed on the screen. This graphic representation is then shown on a videotape monitor on the Buck Rogers set.

"This equipment has a lot to offer," Elam said, "and we have only begun to take advantage of the graphic system's varied capabilities. The use of graphics on the Buck Rogers show has been such a success that the same system will provide the special effects for some of the "Battlestar Galactica" programs to be presented over the next season," he concluded.

Railroad Shipments on Right Track

An American farm might seem the least likely pace for electronic technology to have an impact. But the traditional image of the Kansas farmer awaiting the fall and spring planting, subject to the delays of the railroads for shipments of fertilizer and chemicals, is no longer accurate. International Minerals and Chemical (IMC) Corporation's Fertilizer Group is utilizing a data processing system that improves the farmer's control over this problem.

In railroad freight offices around the United States, IMC's Fertilizer Group has stationed Texas Instruments Silent 700 Model 745 Portable Data Terminals to provide a communications link between the host computer in Chicago and the railway station agents all over the U.S. In addition, the Fertilizer Group's traveling sales force carries TI 745's as the primary tool of their customer service system. Through this network IMC's customers have immediate answers to questions like, "What freight car is my shipment in?" and, "Where was the train last sighted?" This information helps the customers to better plan the schedules for their planting season.

In railroad freight offices, the 745 terminals receive detailed shipping information from the IMC Fertilizer Group's host computer. If a sales representative needs details on a customer's fertilizer shipment, the railway agent can use the 745 to call the host computer and within minutes he will receive a printout detailing train car numbers and destinations of the freight cars to be dropped by a unit train system.

To receive a printout on the TI data terminal, the railway station agent simply has to plug the 745 into an electrical outlet and place a standard telephone receiver into the 745's built-in acoustic coupler to connect to the host computer, said the company.

The IMC sales representatives use the 745's to access information on the status of a customer's order. Even while the freight cars are in transit from a plant or warehouse, salespeople can access the car number and routing for their customers almost instantly. Each day they receive freight car location messages from across North America via the 745 terminal. For added customer ease, with the TI portable terminal, the salesperson can also review a customer's total account records either before a meeting or during a customer visit.

☆☆☆ Announcements ☆☆☆

Club Correction

The correct name and phone number for ACSCO's (Amateur Computer Society of Central Ohio) TRS-80 special interest group are John Cramer, (614) 279-8271. ACSCO also has a CBBS group; contact Ben Miller at (614) 272-2759.

Boston Computer Society

The Boston Computer Society, a resource center for the microcomputer industry, provides services for everyone from business people to engineers, students to homeowners, educators to physicians, lawyers to programmers.

General meetings provide a forum for information exchange. Guest speakers have covered product reviews, computer music, microcomputers in education, robots, business computers and speech synthesis. Meetings are held the fourth Wednesday of the month at 7:00 p.m.

The society also offers The Boston Computer Update, a bimonthly microcomputer magazine, plus user groups for the Apple, North Star, OSI, Pet and TRS-80. Special interest groups for educators and Pascal users are currently offered.

For more information on the magazine or user-groups contact Jon Rotenberg at The Boston Computer Society, 17 Chestnut St., Boston, MA 02108.

Houston 80-Users

The 80-Users of Houston club meets at 7:30 p.m. the first Wednesday of each month, at the Bellaire Chamber of Commerce Building, 6900 S. Rice in Bellaire, TX. For more information, contact Ben Taylor, 3723 Purdue, Houston, TX 77005; (713) 664-5823.

Electronic Music

The New England Conservatory of Music in Boston, MA will hold a Summer Session from June 30 to August 8, 1980, featuring workshops, courses and master classes. Of special interest is the Electronic Music Workshop with Robert Ceely, June 30 to July 3.

The workshop will be divided into two sessions. Mornings will include lectures and demonstrations of the hardware and software of Electronic Music and discussions of how and why synthesizers work and the theory behind their sounds. Video tape is used to give over-the-shoulder views of a wide variety of synthesizers and related equipment. The afternoon sessions will be individual hands-on experience with the ARP, MOOG, BUCHLA and EML Synthsizers. Studio technique covering multi-channel recording, sel-sync, overdubbing,

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reverberation, etc., sophisticated sequencing techniques, and unusual patch configurations will also be explored and demonstrated.

For additional information contact Robert L. Annis, New England Conservatory Summer School, 290 Huntington Ave., Boston, MA 02115.

Investors Association

MicroComputer Investor is the journal of the MicroComputer Investors Association (MCIA). MCIA was founded in 1976 as a professional, nonprofit association of persons who utilize microcomputers in making and managing investments.

All back issues of the journal are available to new members. Each journal contains narratives together with computer programs which implement diverse aspects of investment management.

To obtain an information packet send $2 to J. Williams, MCIA, 902 Anderson Drive, Fredericksburg, VA 22041.

Personal Computer Fair

The Northwest Computer Society and the Pacific Science Center will be holding the third annual Personal Computer Fair November 8 to 9, at the Pacific Science Center, Seattle, WA.

The theme of this year's Fair is "Hands On". The public will have access to as many computers and terminals as possible. There will also be presentations geared to the beginner and the merely curious, as well as to the experienced professional.

For more information contact the Northwest Computer Society, P.O. Box 4193, Seattle, WA.

Connecticut TRS-80 Group

Westport Users Group 80, a TRS-80 users group, has been formed in Norwalk, CT. For more information contact the club at P.O. Box 726 Belden Station, Norwalk, CT 06852.

Polymorphic Users Group

The Southeastern PolyMorphic Users Group has announced their new newsletter, PolyLetter. PolyLetter features program reveiws, program listings, helpful hints, PEEK and POKE locations, want-ads and articles written by users.

PolyLetter, published bimonthly, is available for $5 a year to nonmembers. Contact PolyLetter, 207 Marray Dr., Atlanta, GA 30341; (404) 458-9711.

Classroom Computer Conference

A conference with the theme "Classroom Applications of Computers in Grades K-12" will be held in the Fall of 1980 in California. Sponsored jointly by Computer-Using Educators, the Santa Clara Valley Mathematics Association and The California Science Teachers Association, the conference will include tutorial sessions, workshops, industrial exhibits of hardware and software and excursions to Silicon Valley industrial sites.

Conference dates are September 26 to 27 at Independence High School, San Jose, CA.

For more information contact Computer-Using Educators, W. Don McKell, Independence High School, 1776 Educational Park Drive, San Jose, CA 95133.

Education Courses

The Educational Activities Board of the Institute of Electrical and Electronics Engineers, Inc., is offering two courses, "Future Trends in Computer-Based Instructions" and "Johnny Microseed," June 26 to 27 in Norfolk, VA.

"Future Trends" is an introduction for those who are thinking about setting up a comuter-based educational system, or those who use computer-based systems in education. Educators and engineers who don't have preliminary knowledge of these systems can benefit greatly from the two-day program. Topics to be covered include Survey of Modern Computer-Based Instruction Systems, Introduction to Authoring of Computer Based Instruction Lessons, Provisions of Instructional Aids and Student Record Keeping, Administration of Computer-Based Laboratory, and Computer-Based Instruction Hardware and Software.

Registration fees for the course are: early registration for IEEE members, $145; at the door, $165; Non-member early registration, $180; at the door, $205.

"Johnny Microseed" is for engineers and engineering educators and will use as a specific example the Intel 8080 Microprocessor System. It will also include an overview of current microprocessor technology, including 4-, 8-, 16-bit microprocessors, bit slices and single chip devices. A short discussion of microprocessor education will be included, addressing such issues as getting started, future perspective curriculum, involvement of non-EEs, retraining of faculty.

Registration fees for the course are: IEEE member early registration, $145; at the door, $165; Non-member early registration, $180; at the door, $205.

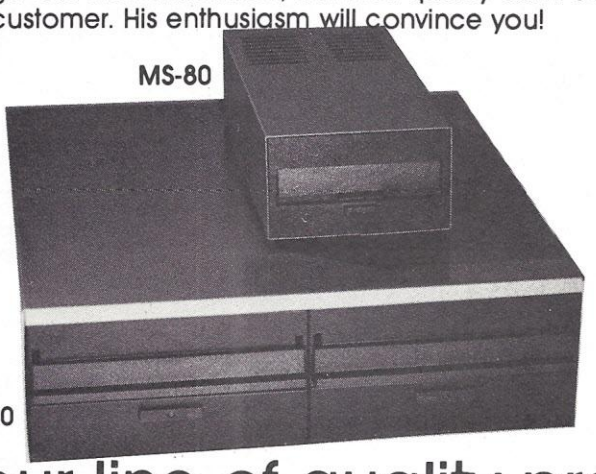
For further information on these courses contact Vincent J. Giardina, Manager of Continuing Education, 445 Hoes Lane, Piscataway, NJ 08854; (201) 981-0060, ext. 174/175. Or contact Gerald Engel, Computer Sciences Department, Christopher Newport College, 50 Shoe Lane, Newport News, VA 23606; (804) 599-7242.

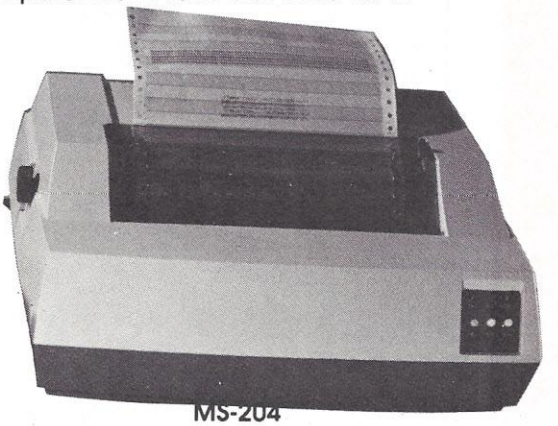
Unusual Application?

If you use your computer for an interesting or intriguing application, why not write up a short (500 to 1000 words) article telling us about it? Make it light and newsy. Send your submission to Random Access, *Personal Computing,* 1050 Commonwealth Ave., Boston, MA 02215.

NOBODY CAN BEAT THE MATCHLESS QUALITY/DOLLAR RATIO!

Others may charge less than Matchless, but their quality can't compare. Don't take our word for it. Ask a Matchless customer. His enthusiasm will convince you!





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CIRCLE 9

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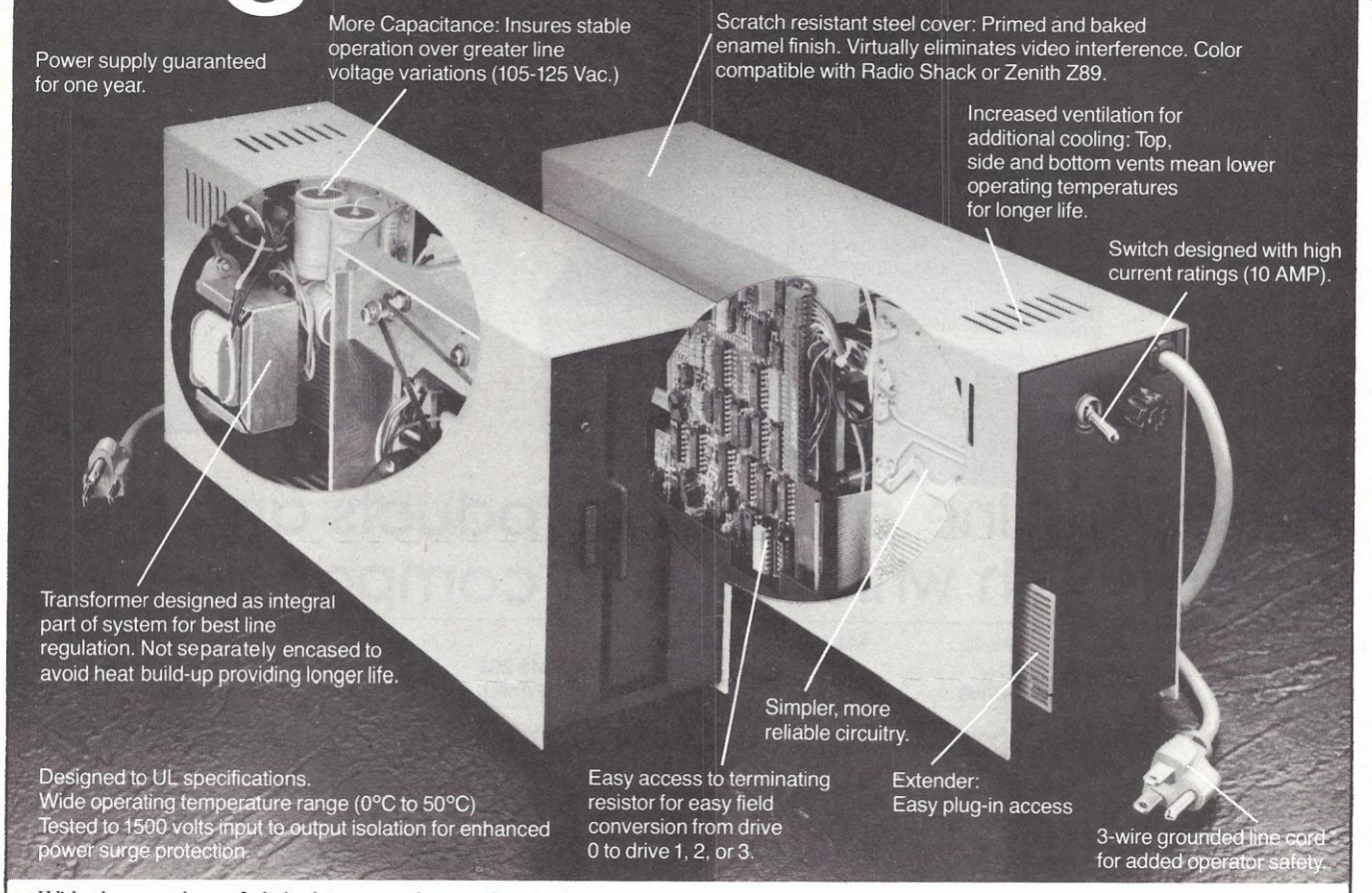

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CIRCLE 10

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CIRCLE 11

Does a Computer Have a Personality?

BY WILLIAM R. PARKS

In a recent talk I gave to students at a nearby high school in my home-town of Dunkirk, New York — two topics were suggested by a mathematics teacher, Mr. James Will, who is also a micro-computer enthusiast. His topics formed the main theme of my lecture and follow-up discussion. They were: 1) Does a computer have a personality? and 2) Does a computer think?

My first response to each question is a "qualified yes." A computer does have a personality in the sense that its personality is determined by the skill, artistry of presentation, and experience of the programmer. And a computer may also be said to think! The level of reasoning and logical decision-making in the program can be considered thoughts of the programmer which are realized during the running or execution of the program.

Notice that in each answer I have related everything back to the programmer. It is his personality and his thought processes that are "programmed" into the computer at the time of execution. In this qualifed sense the computer is thinking and personalizing its actions. The programmer, however, is the conscience and/or mind of the computer's thoughts and personality.

This point is illustrated by an actual case relating to the computer's personality. A banking system in a large metropolitan area had converted to an on-line computing system for its tellers. Soon the tellers were sending complaints to the managment concerning the hostile manner in which they were being treated by the computer. The programmer had failed to realize the importance of human factors in a dialogue between man and computer. In this case one major point of the complaint was the manner in which the computer asked the teller to reenter data that was apparently faulty. The computer printed the command "REENT" on the CRT screen.

The word "REENT" was an instruction to the tellers that the data just entered was to be reentered again. Tellers did not like being ordered about by a computer that used abbreviated commands. After the complaints were registered, management asked the programmer to change the message from "REENT" to "REENTER PLEASE." Suddenly and quite dramatically, complaints from the tellers stopped.

This may seem to be a minor point. However, it illustrates the personal needs of regular computer users. The personality of this banking computer became more polite! So politeness *can* be programmed into a computer. There are many other ways to enhance the personalities of conversational computers; for instance, you could have a friendly, soothing voice coming out of the terminals' speakers.

Implications for the future are apparent. Software houses that expect to succeed in marketing their products will have to take into account the "personalities" latent in their programs. The science of human factors and the art of programming will become important partners in the development of man-machine dialogues. When we have universal recognition of those human-like traits that lurk in computer systems, then we will be more careful in our programming styles. Not only will computers be helpful but also they will be quite friendly in their modes of operation.

Science fiction writers often picture computers of the future as having personalities. This is a healthy recognition of the fact that a computer can be programmed to have human-like characteristics. When you write a complicated program that creates a man-machine dialogue session at the keyboard terminal — you must ask yourself this question: what personality, if any, is latent in the program? You can even consider describing in advance those personal characteristics you intend to program into the computer. It is during the running of the program that this personality will emerge.

Now, "Does a computer think?" First, you should restrict your definition of thinking to certain kinds of reasoning processes that occur in the "human computer" (the human brain.) Those kinds of reasoning and computational processes can be programmed into the computer. Steps can be introduced in a program that simulate human thought. Therefore, I have to conclude that the computer can think as I do. However, if you include "self-awareness" in the thinking process — that can come only from a human user of the system. Together, man and computer constitute a computer system! As a computer user or as the computer's programmer — you are part of the whole system. Sometimes it is difficult to decide where one process begins and another ends. Personality, thinking, and other human-like traits are constantly being programmed into electronic computers. Let's hope that in the future the human programmer will always retain for himself the lofty role of conscience or mind of the computer.

We have had reports of "spying" computers. Programs have been written that give the computer a personality which actually abuses human rights and dignity. Evil personalities are emerging from computers of certain agencies in the world. To counteract such forces we will have to create personable computers that think well of us humans!

(Professor Parks is in the Department of Mathematics and Computer Science at Fredonia State University College, Fredonia, NY.)

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CIRCLE 12

Keeping Track of Business Contacts

BY LOYD BULMER

Most business people keep a list of contacts: names, addresses and phone numbers of suppliers of various products or services. But if the list is kept alphabetically by name, the problem periodically arises of forgetting the name associated with a particular service. You can keep a second list alphabetically by service, followed by the name, address and phone number.

For example, look at the telephone directory. The white pages carry the alphabetical listings and the yellow pages the service listings.

Your computer can easily handle one master list, yet let you extract the required information in several different ways.

Contacts, written for the TRS-80 with one disk drive and 16K RAM, utilizes random access data files for speed in execution and ease in updating information. Sequential files, while easier to write, would decrease efficiency in updating files or adding to them. The program was designed for a multi-city list of contacts, so that the city and the service could be designated by the user. A supplementary designation is available for the service — such as "hospital equipment (wholesale)" as distinct from "hospital equipment (retail)". The program can retrieve on the single phrase "hospital equipment", which would include both wholesale and retail.

City is not the sole criterion for retrieval by location. The INSTR function can retrieve by city, state or province, or even country, depending on how the information was input.

The input operation is perhaps the most critical and uniformity must be established at the outset. If a retrieval is to be based on the state of New York, then the INSTR function will only retrieve those entries which have the state name spelled out. It will ignore and fail to return entries where the encoding is

Program Listing

```
1 ON ERROR GOTO 6500
10 CLEAR2000:CLS:PRINT@470,"LIST OF CONTACTS"
20 PRINT:PRINT"WHAT FUNCTION IS REQUIRED?
30 PRINT"   1-INPUT OF DATA
40 PRINT"   2-RETRIEVAL OF DATA
50 PRINT"   3-TO CORRECT
60 PRINT"   4-TO REVIEW
70 PRINT"   5-TO EXIT THE PROGRAM
80 INPUT"WHICH FUNCTION (NUMBER) IS WANTED ";A
90 IFA>5GOSUB 1540 :GOTO 80
100 IFA=2GOTO 500
110 IFA=5GOTO 1400
120 INPUT"WHAT DRIVE IS REQUIRED (0 TO 3) ";D
130 IFA=4GOSUB7010:GOSUB1530:GOTO1300
140 IFA=3GOSUB7010:GOSUB1530:GOTO1000ELSEGOSUB5000
150 FIELD 2,2 AS A$:GET 2:KE=CVI(A$):CLOSE:GOSUB 7010 :
    GOSUB 1530
160 ONAGOTO 200 , 500 , 1000 , 1300 , 1400
199
    REM----------------INPUT
200 IFSR<2GOSUB 1530 :GET 1,PR
210 KE=KE+1:GOSUB 1530 :PRINT"THIS IS ENTRY #";KE;"ON DRIVE";D
220 LINEINPUT"NAME? ";A1$
230 IFLEN(A1$)>25GOSUB 1550 :GOTO 220
240 IFLEN(A1$)=0GOSUB 1580 :GOTO 220
250 LINEINPUT"ADDRESS? ";A2$
260 IFLEN(A2$)>52GOSUB 1570 :GOTO 250
270 IFLEN(A2$)=0GOSUB 1580 :GOTO 250
280 LINEINPUT"PHONE NUMBER? ";A3$
290 IFLEN(A3$)>16GOSUB 1590 :GOTO 280
300 LINEINPUT"SPECIALTY SUBJECTS? ";A4$
310 IFLEN(A4$)>32GOSUB 1600 :GOTO 300
320 GOSUB 4000 :GOSUB 3000 :IFSR=2GOSUB 4020
330 INPUT"IS THERE ANOTHER ENTRY ";AF$
340 IFAF$="NO"THEN350ELSE210
350 GOSUB 6000 :FORA1=1TO1000:NEXT:GOSUB 5000
360 FIELD 2,2 AS A$
370 LSET A$=MKI$(KE)
380 PUT 2
390 CLOSE 2:IFSR=0THENCLOSE:GOTO20ELSEGOSUB4020:CLOSE:GOTO20
499
   REM----------------RETRIEVAL
500 D=0:INPUT"DO YOU WANT A PRINTER-COPY ";AF$
510 IFAF$="NO"THENA3=0ELSEA3=1
520 IFA3=1GOSUB 1500
530 CLS:PRINT"WHAT RETRIEVAL IS WANTED?
540 PRINT"   1-BY NAME
550 PRINT"   2-BY SUBJECT(S)
560 PRINT"   3-BY ADDRESS
570 PRINT"   4-BY SUBJECT(S) AND ADDRESS
580 INPUT"WHICH RETRIEVAL (NUMBER) IS WANTED ";A
590 IFA>4GOSUB 1540 :GOTO 580
```

```
600 ONAGOTO 610 , 640 , 720 , 640
610 LINEINPUT"WHICH NAME IS REQUIRED? ";AG$
620 IFLEN(AG$)>25GOSUB 1560 :GOTO 610
630 GOTO 730
640 INPUT"ARE 1 OR 2 SUBJECTS REQUIRED ";A2
650 IFA2>2GOSUB 1540 :GOTO 640
660 ONA2GOTO 670 , 690
670 LINEINPUT"WHAT SUBJECT IS WANTED? ";AH$
680 IFA=4THEN 720 ELSE 730
690 LINEINPUT"WHAT IS FIRST SUBJECT WANTED? ";AH$
700 LINEINPUT"WHAT IS SECOND SUBJECT WANTED? ";AI$
710 IFA=2THEN 730
720 LINEINPUT"WHAT ADDRESS IS WANTED? ";AJ$
730 GOSUB 7000
740 FORA1=1TOLOF(1)
750 GET 1,A1
760 FORSR=1TO2:GOSUB 4000 :GOSUB 4060 :ONAGOTO 770 , 800 ,
    900 , 800
770 A8=INSTR(A6$,AG$)
780 IFA8>0GOSUB 1700
790 NEXTSR:NEXTA1:CLOSE:IFD<4THEN730 :GOSUB 1610 :GOTO 930
    ELSE930
800 A8=INSTR(A9$,AH$)
810 IFA8=0GOTO 920
820 IFA=2 AND A2=1THENGOSUB 1700 :GOTO 920
830 IFA=2 AND A2=2THEN 860
840 IFA=4 AND A2=1THEN 900
850 IFA4=4 AND A2=2THEN 860
860 A8=INSTR(A9$,AI$)
870 IFA8=0THEN 920
880 IFA=4GOTO 900
890 GOSUB 1700 :GOTO 920
900 A8=INSTR(A7$,AJ$)
910 IFA8>0GOSUB 1700
920 A8=0:NEXTSR:NEXTA1:CLOSE:IFD<3THEN 730 ELSEGOSUB 1610
930 INPUT"IS ANOTHER RETRIEVAL WANTED ";AF$
940 IFAF$="NO"THEN20ELSE500
999
   REM---------------CORRECT
1000 K9=KE:A3=0
1010 INPUT"WHICH RECORD NEEDS CORRECTING ";KE:GOSUB 1530 :
     GET 1,PR
1020 CLS:GOSUB 4000 :GOSUB 4060 :A3=0:GOSUB 1700
1030 PRINT"HERE ARE THE NUMBERS OF THE FIELDS
1040 PRINT"1-NAME   2-PHONE NUMBER   3-ADDRESS   4-SUBJECTS
1050 INPUT"WHICH FIELD (NUMBER) NEEDS CORRECTING ";A
1060 IFA>4GOSUB 1540 :GOTO 1050
1070 LINEINPUT"TYPE THE NEW DATA FOR THAT FIELD. ";A0$
1080 ONAGOTO 1090 , 1110 , 1130 , 1150
1090 IFLEN(A0$)>25GOSUB 1550 :GOTO 1070
1100 GOTO 1160
1110 IFLEN(A0$)>16GOSUB 1590 :GOTO 1070
1120 GOTO 1160
1130 IFLEN(A0$)>52GOSUB 1570 :GOTO 1070
1140 GOTO 1160
1150 IFLEN(A0$)>32GOSUB 1600 :GOTO 1070
1160 ONAGOTO 1170 , 1180 , 1190 , 1200
1170 A6$=A0$:GOTO 1210
1180 A8$=A0$:GOTO 1210
1190 A7$=A0$:GOTO 1210
1200 A9$=A0$
1210 A1$=A6$:A2$=A7$:A3$=A8$:A4$=A9$:A5$=MKI$(KE)
1220 GOSUB3000:GOSUB4000:GOSUB4020
1230 INPUT"IS ANOTHER CORRECTION WANTED ON THIS DRIVE ";AF$
1240 IFAF$="NO"THENKE=K9:CLOSE:GOTO20ELSE1010
1299
    REM-----------------REVIEW
1300 A3=0:INPUT"HIGHEST NUMBER WANTED FOR REVIEW ";AA
1310 INPUT"LOWEST NUMBER WANTED FOR REVIEW ";AB
1320 AC=INT((AA-1)/2)+1:AD=INT((AB-1)/2)+1
1330 FORA1=ADTOAC
1340 GET 1,A1
1350 FORSR=1TO2:GOSUB 4000 :GOSUB 4060 :GOSUB 1700
1360 NEXTSR:NEXTA1:GOSUB 1610 :CLOSE:GOTO 20
```

N.Y. or NY. And, the reverse holds true. Additionally, a typographical error on input will result in a failure to retrieve. Similarly, a typographical error on the request to retrieve will result in a faulty retrieval. This is why the "review" function is built into the program — to permit the operator (or supervisor) to see precisely what has been put into the data base, and then make corrections as warranted.

The program also allows you to display retrieval on the video screen and/or on a line printer. This function in turn provides options for data retrieval, or for users who do not have line printers.

The program was written for execution under TRSDOS 2.1, and has been in operation since May 1979 without problems. It also runs under TRSDOS 2.2 and NEWDOS.

You can modify the program to eliminate the disk feature and save program and data in the cassette mode. However, you'll experience extensive time delay in loading the program and the associated data with these modifications.

You can modify the program to encompass fewer than four disk drives. Just delete the lines containing references to non-existing drives in the sequences 5000 to 5040, 6000 to 6040 and 7010 to 7050, as well as changing the maximum number of drives to be utilized (the variable D) in lines 130, 920 and 10010.

The program is written in a modified modular format. REM lines are downarrowed and given a non-standard incremental number. None of the GOTOs refer back to REM lines, so users may eliminate such lines without causing the program to malfunction.

Lines 1 to 90 initialize the program, with 100 to 160 providing the "hub" for the desired execution. Line 100 is a fail-safe against a typographical error input. Lines 200 to 390 embrace the input module, with fail-safes to guard against overly long input and if that occurs, to produce error messages which, in most cases, advise the operator of the number of excess characters in the input. Line 200 provides for maximum utilization of disk space: the previous physical record is retrieved if the second sub-record hasn't been filled from a previous input session. The display of the record number and the drive number in line 210 aids in advising the operator of the drive and record number in the event that an error is made during input. Although it is possible to insert statements following line 310 to review

Program Listing continued

```
1399
   REM---------------EXIT
1400 CLS:CLOSE:PRINT"THIS SESSION IS ENDED":END
1499
     REM--------------SUB-ROUTINES
1500 A9=PEEK(14312):IFA9=63RETURN
1510 CLS:PRINT:PRINT:PRINT"   TURN ON THE PRINTER, PLEASE!
1520 A9=PEEK(14312):IFA9=63THENRETURNELSE 1520
1530 PR=INT((KE-1)/2)+1:SR=KE-2*(PR-1):RETURN
1540 PRINT"SORRY.   WRONG NUMBER. ":RETURN
1550 PRINT"THIS FIELD HAS A LIMIT OF 25 CHARACTERS.   YOU ARE";LEN(A1$)-25;
   "TOO LONG.   TRY AGAIN. ":RETURN
1560 PRINT"THIS FIELD HAS A LIMIT OF 25 CHARACTERS.   YOU ARE";LEN(AG$)-25
   "TOO LONG.   TRY AGAIN. ":RETURN
1570 PRINT"THIS FIELD HAS A LIMIT OF 52 CHARACTERS.   YOU ARE";LEN(A2$)-52;"TOO LONG.
  TRY AGAIN. ":RETURN
1580 PRINT"THIS FIELD MUST HAVE AN ENTRY.   TRY AGAIN. ":RETURN
1590 PRINT"THIS FIELD HAS A LIMIT OF 12 CHARACTERS.   TRY AGAIN. ":RETURN
1600 PRINT"THIS FIELD HAS A LIMIT OF 32 CHARACTERS.   YOU ARE";LEN(A4$)-32;"TOO LONG.
  TRY AGAIN. ":RETURN
1610 PRINTSTRING$(63,61):RETURN
1699
    REM---------------PRINT
1700 PRINT"NAME:  ";A6$;TAB(32)"PHONE NMBR:  ";A8$
1710 IFA3=0THEN 1730
1720 LPRINT"NAME:  ";A6$;TAB(32)"PHONE NMBR:  ";A8$
1730 PRINT"ADDRESS:  ";A7$
1740 IFA3=0THEN 1760
1750 LPRINT"ADDRESS:  ";A7$
1760 PRINT"SUBJECTS:  ";A9$;TAB(43)"COMPUTER #";D;"-";A0
1770 IFA3=0THEN 1790
1780 LPRINT"SUBJECTS:  ";A9$;TAB(43)"COMPUTER #";D;"-";A0
1790 PRINTSTRING$(63,45)
1800 IFA3=0RETURN
1810 LPRINTSTRING$(63,45):RETURN
3000 LSET AA$=A1$:LSET AB$=A2$:LSET AC$=A3$:LSET AD$=A4$:LSET AE$=MKI$(KE):RETURN
3999
   REM---------------FIELD
4000 FIELD 1,((SR-1)*127) AS A5$,25 AS AA$,52 AS AB$,16 AS AC$,32 AS AD$,2 AS AE$
4010 RETURN
4020 PUT 1,PR
4030 FORSR=1TO2
4040 A1$="":A2$="":A3$="":A4$="":GOSUB 3000 :GOSUB 4000
4050 NEXT:SR=0:RETURN
4060 A6$=AA$:A7$=AB$:A8$=AC$:A9$=AD$:A0=CVI(AE$):RETURN
5000 ONDGOTO 5010 , 5020 , 5030 , 5040
5010 OPEN"R",2,"CONKEY:0":RETURN
5020 OPEN"R",2,"CONKEY:1":RETURN
5030 OPEN"R",2,"CONKEY:2":RETURN
5040 OPEN"R",2,"CONKEY:3":RETURN
6000 ONDGOTO 6010 , 6020 , 6030 , 6040
6010 KILL"CONKEY:0":RETURN
6020 KILL"CONKEY:1":RETURN
6030 KILL"CONKEY:2":RETURN
6040 KILL"CONKEY:3":RETURN
6500 IF ERR/2 +1=61 THEN10010ELSERESUME
7000 D=D+1
7010 ONDGOTO 7020 , 7030 , 7040 , 7050
7020 OPEN"R",1,"CONDATA:0":RETURN
7030 OPEN"R",1,"CONDATA:1":RETURN
7040 OPEN"R",1,"CONDATA:2":RETURN
7050 OPEN"R",1,"CONDATA:3":RETURN
9999
   REM-------------DISKETTE FULL
10010 IFD=3THEN12000
10020 PRINT:PRINT"   THE DISKETTE ON DRIVE";D;"IS NOW FULL.
THE SYSTEM NEEDS A MINUTE TO REORGANIZE.
10030 GOSUB6000:D=D+1:GOSUB5000:CLOSE:KE=0:GOSUB7010:GOTO210
12000 PRINT:PRINT"   ALL THE DISKETTES IN THIS VOLUME ARE NOW FULL.   THERE WILL
BE FURTHER INSTRUCTIONS IN A MOMENT. ":GOSUB6000:CLOSE
12010 PRINT:PRINT"   REMOVE ALL THE DISKETTES, PLACING THEM IN THEIR PROTECTIVE
SLEEVES, AND INSERT THE NEXT VOLUME, MAKING SURE THAT THE
DISKETTE NUMBERS MATCH THE DRIVE NUMBERS.
12020 INPUT"   WHEN THIS HAS BEEN DONE, HIT THE 'ENTER' KEY ";CA$
12030 D=0:KE=0:GOSUB5000:CLOSE:GOSUB7010:GOTO210
```

Sample Run

```
WHAT FUNCTION IS REQUIRED?
   1-INPUT OF DATA
   2-RETRIEVAL OF DATA
   3-TO CORRECT
   4-TO REVIEW
   5-TO EXIT THE PROGRAM
WHICH FUNCTION (NUMBER) IS WANTED ? 2
DO YOU WANT A PRINTER-COPY ? NO
WHAT RETRIEVAL IS WANTED?
   1-BY NAME
   2-BY SUBJECT(S)
   3-BY ADDRESS
   4-BY SUBJECT(S) AND ADDRESS
WHICH RETRIEVAL (NUMBER) IS WANTED ? 2
ARE 1 OR 2 SUBJECTS WANTED ? 1
WHAT SUBJECT IS WANTED? BAND MUSIC

NAME: LOYD BULMUR                PHONE NMBR: 416 921-7380
ADDRESS: 55 CHARLES ST. EAST, APT 607, TORONTO, ONT. CANADA
SUBJECTS: BAND MUSIC.  TRS-80 PROGRAMMING  COMPUTER # 0 - 1

WHAT FUNCTION IS REQUIRED?
   1-INPUT OF DATA
   2-RETRIEVAL OF DATA
   3-TO CORRECT
   4-TO REVIEW
   5-TO EXIT THE PROGRAM
WHICH FUNCTION (NUMBER) IS WANTED ? 4
WHAT DRIVE IS REQUIRED (0 TO 3) ? 0
HIGHEST NUMBER WANTED FOR REVIEW ? 2
LOWEST NUMBER WANTED FOR REVIEW ? 1

NAME: LOYD BULMUR                PHONE NMBR: 416 921-7380
ADDRESS: 55 CHARLES ST. EAST, APT 607, TORONTO, ONT., CANADA
SUBJECTS: BAND MUSIC  TRS-80 PROGRAMMING   COMPUTER # 0 - 1
-------------------------------------------------------------
NAME: PRIMERO CONSULTANTS INC.   PHONE NMBR: ----
ADDRESS: BOX 670 POSTAL STATION 'K' TORONTO, ONT. CANADA
SUBJECTS: TRS-80 PROGRAMMING              COMPUTER # 0 - 2
-------------------------------------------------------------
```

Cataloging Simplified

To find out the program names on any diskette, disk users have to go from Disk Basic to DOS, call the DIRectory and then return to Disk Basic to load and execute the program. This programette overcomes this annoying process.

Enter the names of the programs in the DATA line exactly the way the file specs are in the disk directory, including file extensions, drive numbers and passwords, if used.

If more programs are added, make the number in the FOR . . . NEXT loop equal the number of programs in the DATA line.

Catalog can be listed in the AUTO command for users of Apparat's NEWDOS and in the COMMAND program of Racet Computes' "Comproc" program.

—Loyd Bulmer

Sample Run

```
                CATALOG FOR DISKETTE LB-19
1 - CONTACTS   2 - DISKFOTO   3 - DISKDISC   4 - PAYROLL/BAS
               5 - SPORTS
  WHICH PROGRAM IS TO BE RUN ? 5_
```

Program Listing

```
10 CLS:PRINTTAB(19)"CATALOG FOR DISKETTE LB-19
20 DATA CONTACTS,DISKFOTO,DISKDISC,PAYROLL/BAS,SPORTS
30 FORK=1TO5:READA$(K):PRINTK;"- ";A$(K),:NEXT:PRINT
40 INPUT"   WHICH PROGRAM IS TO BE RUN ";L
50 RUNA$(L)
```

the input on the screen prior to committing it to the buffer, this feature was not incorporated.

Note that the key number is stored separately from the data in lines 360 to 380.

Lines 500 to 940 comprise the retrieval module and the sequence commences by asking whether a printer copy is required. If the answer is yes, the program branches to 1500 to determine whether the printer is turned on, and if not, it "stalls" until the printer is turned on. The fail-safes built into the input section regarding the length of strings are repeated here.

Also note that for speed of execution, when the program asks for a Yes/No answer, the operator does *not* have to type Yes for a positive answer. Simply pressing the ENTER key will generate a Yes answer. Only if a no is required should the response be typed in full. Operators who have used this program say that this feature aids tremendously in speeding up their input.

Lines 1000 to 1240 allow errors in the data base to be corrected quickly and efficiently. The fail-safes for lengths of strings as used in the input and retrieval modules have been incorporated here as well.

Lines 1300 to 1360 embrace the review procedure, allowing the operator or supervisor to look at the data base at any time to check for input errors. The review function generates the drive number and the record number for utilization in the correct function detailed earlier.

Lines 1500 to 1610 are repeated subroutines. Lines 1700 to 1810 detail the printing of the retrieved or reviewed records. Lines 3000 to 4060 involve the setting of the buffer, the delineations for the field, the execution of the PUT command and the purging of the buffer of previously entered data. Lines 5000 to 7050, broken into sub-modules of 5000 to 5040, 6000 to 6040 and 7000 to 7050, direct the program to the proper drive. Line 6500 is the error line which branches to a subroutine (lines 10010 to 12030) if a disk is full. This action either re-directs the program to the next available disk or, if all the disks are full, instructs the operator to insert new data disks for further operations. This particular set of instructions assumes you have additional formatted disks, with labels affixed in advance, available to insert into the correct drives. □

Mr. Bulmer's previous programs included "Foto Finder" in the July 1979 Personal Computing *and "Exam" in the September 1979 issue.*

Check Entry and Retrieval System

BY WILLIAM LAPPEN

Here's a program to help simplify your finances. Written for TRS-80, it will manipulate inflow and outflow information for up to four bank accounts, and numerous categories, giving you activity by account plus summary and detail for all categories. By organizing the necessary information, the program can be a big help with your taxes. And as an added bonus, it even prints your checks for you.

The basic approach is for you to put all your bank accounts (up to four) on the computer and then enter *every* inflow or outflow from those accounts. For example, when you pay a utility bill, enter it into your computer. Since the computer keeps a running balance of your accounts, it will respond by giving you the correct balances. Hence, you may use this system to replace your manual system. (This procedure is not recommended, though — computers are moody sometimes.)

You must input and store five pieces of information for each check written. The date, payee (payor for income) and amount are the same as you currently use in your manual system. Along with these, you will identify the bank account and categroy for each entry made. The bank accounts are "savings", "checking" and so forth. Categories include "wages", "interest" and "taxes". More on this later.

Once the entries are made, the computer becomes a financial wizard. It will tell you how much you paid in interest for the year or how much a certain person paid you, plus answer most tax-related questions about your financial transactions.

Note: this system is written for a TRS-80 with a disk drive. If you do not have a disk, you can convert to tape for the cost of slower storage and retrieval.

To get a feel for the system, let's follow a sample of a few entries. The first program, Index, which drives the system, is your menu (Figure 1). All programs return to Index to get new commands.

First, create a file to hold the information you're about to enter. Run the File program (number 7 on the menu). The new account will be called Test (original, eh?). Let's use just two bank accounts (checking and savings) and 15 categories. You probably won't need more than 15 categories, but the screen

```
        CASH RECORD SYSTEM


  1 ENTRY
  2 SUMMARY AND DETAIL
  3 PRINT ACCOUNT ACTIVITY
  4 CHANGE RECORDS
  5 RE-COUNT ACCOUNTS
  6 MOVE FILE TO NEW DISK
  7 CREATE NEW FILE
  8 RESET FILE


 ACTION ?
```

Figure 1

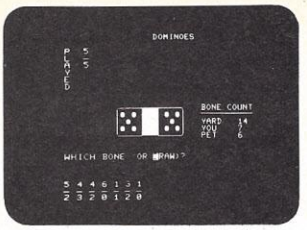
```
                    TEST CASH RECORD  1979
         INFLOWS                          OUTFLOWS
 1 WAGES                          7 INTEREST      12 AUTO
 2 INTEREST                       8 MEDICAL       13 OTHER
 3 DIVIDENDS                      9 INSURANCE     14 TRANSFER
 4 PARTNERS                       10 TAXES        15 NON-DED
 5 OTHER                          11 CONTRIB
 6 NON-TAX                              BANK ACCOUNTS
                                          1 CHECKING
                                          2 SAVINGS
DATE   DESCRIPTION       BANK    CATEGORY AMOUNT     BAL     Y/N



8/18   BAL FWD           CHECKINGNON-TAX  100         100.00  P
CHECKING      0.00              SAVINGS      0.00
```

Figure 2

```
                    TEST CASH RECORD  1979
         INFLOWS                          OUTFLOWS
 1 WAGES                          7 INTEREST      12 AUTO
 2 INTEREST                       8 MEDICAL       13 OTHER
 3 DIVIDENDS                      9 INSURANCE     14 TRANSFER
 4 PARTNERS                       10 TAXES        15 NON-DED
 5 OTHER                          11 CONTRIB
 6 NON-TAX                              BANK ACCOUNTS
                                          1 CHECKING
                                          2 SAVINGS
DATE   DESCRIPTION       BANK    CATEGORY AMOUNT     BAL     Y/N
8/18   BAL FWD           SAVINGS NON-TAX  250         250.00  Y
8/18   CLEMENS           CHECKINGINSURANC 25.34        74.66  Y
8/18   STRAAP            SAVINGS WAGES    125         375.00  Y
8/19   GLENDALE          SAVINGS INTEREST 3.23        378.23  P
CHECKING     74.66              SAVINGS    375.00
```

Figure 3

Software for the PET



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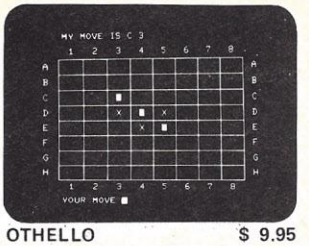

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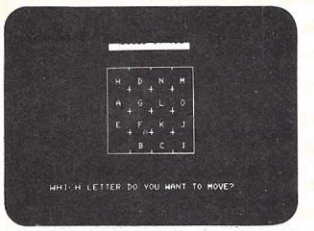

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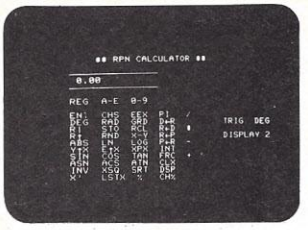

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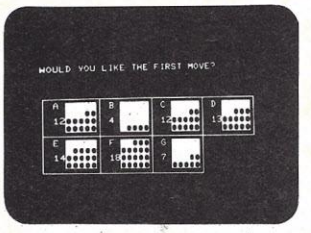

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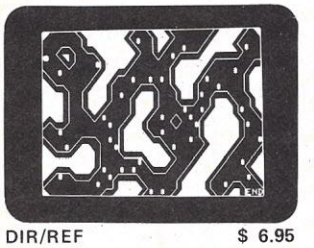
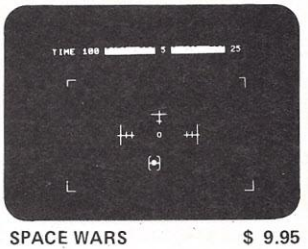


DIR/REF $ 6.95



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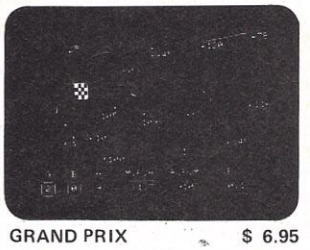

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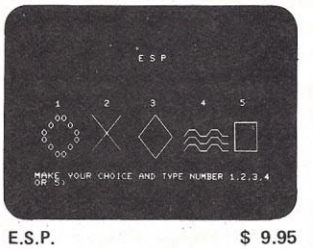

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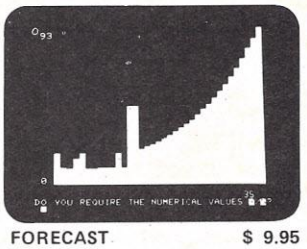

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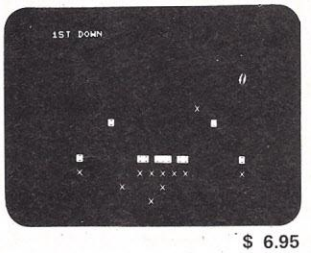

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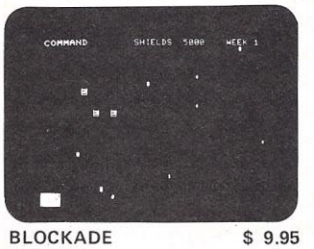

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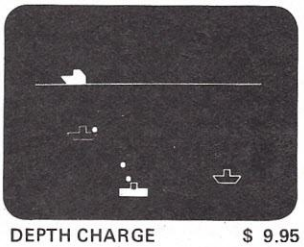

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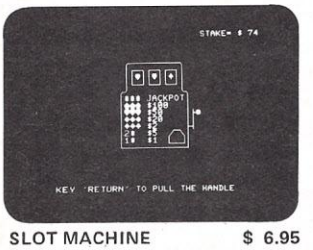

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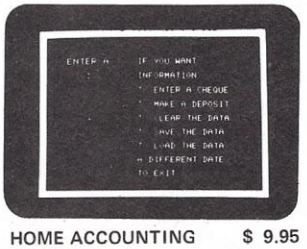

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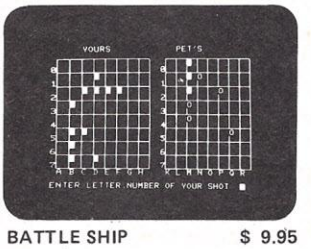

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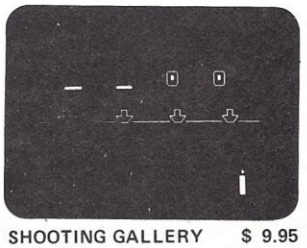

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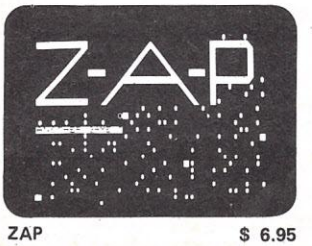

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PROGRAMMA Software Program Products

CIRCLE 14

can display 12 inflow and 12 outflow categories. Inflow categories include "wages" (when you get paid, the money generally goes into your account). Outflows include tax deductible expenses and non-deductible expenses (i.e., bubblegum).

Now that the file is created, you can make some entries. Try Entry (number 1 on the menu) and see what happens. The file created was Test (actually, this is saved as Test/Dat on the disk). The screen quickly goes dark and fills with the categories established in the File program. Once the motion stops, the computer displays a solid cursor in the lower left part of the screen. It is waiting for you to input the date of the entry (the Date title is about four lines directly above the cursor). Before typing anything, notice that the bottom line lists your two accounts and their balances. Since both accounts are empty, the first two entries should fill them. (This is an accounting convention, not a requirement of the program.)

Therefore, the first entry should be the day/month, "18/18", followed by Enter. (It is not necessary to enter the year since it is at the top of the screen and is carried on the file.) Next, the cursor moves over to the Description column. Type in the description in free form. If you use abbreviations, be careful to stick to them — you may try to retrieve entries by them later. This entry may be up to 30 characters. Again, when done, hit Enter. Next, type the number that represents the bank account (1 or 2). The computer will wait until you Enter and then display the account name. Do the same for the Category. Finally, the Amount is entered (you may ignore the pennies if there are none, but use a decimal point when needed.) Once the computer accepts this entry, it will display the BALance in the listed account. If this whole line is correct, hit Y and it will become a part of history. If there are any changes, type N and change only the incorrect entry (use Enter to get back the correct entries).

Figure 2 shows the screen after the first entry. Figure 3 shows what the screen looks like after the fifth entry. The current entry and some preceding entries are displayed to help you keep track of where you are in the entry process. Also, if you want to duplicate exactly the part of the last entry hit Enter. This procedure makes entering many checks with the same date easier. If the Description is only partially the same, use the right arrow to repeat that part and move the cursor over.

When you are done with the entry program, type END for the date. The program will then write out any checks that you have typed in during this session. The first question the program asks is the size of your check. Answer S for small and L for large. If you don't want to send any checks, answer N for none. The program finds the checks you have told it to write (the outflows) and displays them two at a time (Figure 4). The top line shows the check it will write. The second line lets you see if the two should be added together (see next paragraph on multiple entries). Assuming that you want to write the check, enter a 1. The computer displays the old payee and asks if it is correct. Usually, you will use some sort of abbreviation, so you'll want to write out the whole name on the check. Do this just as you would at a regular typewriter (shift for capital letters). Before you hit Enter, put the check into your printer. You may need to change the spacing; checks go into your printer about four spaces to the left of the left margin with the top of the check just showing over the print head. Experiment with this. Hit Enter and watch the check being printed — the numbers are automatically converted to words to help protect your checks. When you are done with the checks, type a 4 and the program will ask for another file. (You may keep many files on the same disk.) If you are done, type END to return to the menu.

There are many checks in life that really represent two or more things. For example, if you make a loan payment, part is interest and part is principal. To handle this, make two entries with the same Date, Description and Bank, but different Categories and Amounts. To write the check, add the duplicated entries before writing it (use 2 on the check writing routine — see Figure 4). Wages should be multiple entries — an inflow for the gross wages and outflows for the tax deductions.

Now that all five entries have been made, you can test the power of the system. From the menu, run the Summary program (Number 2). Again, this program asks for the file name. Once this information is typed in, the computer finds and displays all of the account balances (Figure 5). For example, so far this year, you've

```
8/18 CLEMENS ******25.34
8/18 CLEMENS ******25.34
1  WRITE
2  NEXT CHECK (ADD)
3  IGNORE
4  END
? 1
OLD PAYEE--CLEMENS
PAYEE  BRUCE CLEMENS AND ASSOCIATES
```

Figure 4

```
CHECKING     74.66          SAVINGS    378.23
          INCOME                              OUTFLOW
 1  WAGES          125.00      7  INTEREST          0.00
 2  INTEREST         3.23      8  MEDICAL           0.00
 3  DIVIDENDS        0.00      9  INSURANCE        25.34
 4  PARTNERS         0.00     10  TAXES             0.00
 5  OTHER            0.00     11  CONTRIB           0.00
 6  NON-TAX        350.00     12  AUTO              0.00
                             13  OTHER             0.00
                             14  TRANSFER          0.00
                             15  NON-DED           0.00

                DETAIL ('END' TO STOP)
```

Figure 5

```
                    WAGES
8/18   STRAAP
          TOTAL                        SAVINGS       125.00
DONE                                                 125.00
```

Figure 6

```
8/18    BAL FWD                 CHECKING   NON-TAX        100.00
8/18    BAL FWD                 SAVINGS    NON-TAX        250.00
8/18    CLEMENS                 CHECKING   INSURANCE      -25.34
8/18    STRAAP                  SAVINGS    WAGES          125.00
8/19    GLENDALE                SAVINGS    INTEREST         3.23
           TOTAL                                          452.89
DONE
```

Figure 7

```
                    TEST
                    8/31/79

                    CHECKING ACCOUNT

DATE    DESCRIPTION  CATEGORY   WITHDRAWAL   DEPOSIT   BALANCE

8/18    BAL FWD      NON-TAX                  100.00    100.00
8/18    CLEMENS      INSURANCE     -25.34                74.66



                    TEST
                    8/31/79

                    SAVINGS ACCOUNT

DATE    DESCRIPTION  CATEGORY   WITHDRAWAL   DEPOSIT   BALANCE

8/18    BAL FWD      NON-TAX                  250.00    250.00
8/18    STRAAP       WAGES                    125.00    375.00
8/19    GLENDALE     INTEREST                   3.23    378.23
```

Figure 8

received $125.00 in wages and have paid $25.34 for insurance. If you would like this screen printed, type a Shift P (capital P). Notice that all the financial activities are represented by broad categories. Although most computer systems require very narrow categories (interest paid to Bank X would be a separate category), it is unnecessary in this system.

To find out what makes up the totals in any category, type the number of the category (where the computer asks for Detail). For example, take a look at all of the checks that made up the "wages" category. Type a 1 and the computer displays Figure 6. Notice that it totals all of the entries (1 in this case) for your convenience. When you are done looking at the screen, hit Enter. If you would like to have the screen printed, hit a Shift P (capital P).

If you would prefer to find all entries that relate to "straap", you may enter that from the summary screen (Figure 5). The computer then looks at the Description for the string "Straap" (or substring). Again, it would display and total all of the entries, allow you to print the screen and return to the summary screen. If you want to display all of the entries you made, enter a space (" ") for the search request (Figure 7). To get really fancy, say you wanted to find out how much of the interest was paid to Bank X. To get this answer, your search request would be for the category "interest" and the Description "Bank X" (you would enter "7 & Bank X"). This will only give you the interest paid to Bank X, with the total. So this is how its done on this system! As you can see, it's not too hard, but pretty powerful.

Please, when making entries, don't use the Shift key. Since you can't see the difference between upper and lower case on the TV screen, you may enter a different Description than you are actually searching for. This error is very frustrating since it appears that the computer is only pulling some of the requested Descriptions.

When you are done with this program, type END for your search request, then type END for the file. Once returned to the menu, you may discover some other cute little features. For example, Account Activity (Number 3) will give you the chronological activity by account. Figure 8 shows your entries to the checking account and the savings accounts.

From the menu, Change Records (Number 4) allows you to correct mistakes that have been entered. This program is relatively straightforward, asking for the file name and displaying each entry. If an entry is correct, type Y; if not correct, type N and make the needed change. Remember here that if the figure is an outflow, type a negative number. When you have entered all of the information for the check (or hit the Enter to signify that the previous information was correct), the computer will redisplay the entry and again ask if it is correct. If so, type Y and proceed. To jump forward in the entries, type a number instead of the Y/N. You can move forward (or backward with a negative number) in blocks of five entries. This feature becomes useful when you have a hundred entries on the system and need to change the last one. To end this program, be original and type END.

If you make any changes in the Category or Amount, you will have to Re-count the accounts (Number 5 on the menu). This program runs through all entries for the file, displays and re-totals them. At the end, the program displays the new account balances (Bank first, then Category) and says DONE. If the balances are correct, hit Enter and they will be saved on the disk in place of the old balances.

You might want to take a whole file from one disk and move it to another. Move File (Number 6 on the menu) will do this painlessly. We have already seen how to create a file, but there are times when you want to reset a file. Number 8 on the menu creates a new file under a different name with all of the proper titles but none of the entries. These two programs are useful when you want to start a new year's file. You might move the old file to an archive disk (to keep forever) and then reset the file on the active disk. Remember to run Re-count after resetting a file since the new file has the account balances of the old file.

Check Entry and Retrieval System writes your checks, balances your accounts, prints activity by account, gives summary and detail for all categories and even moves itself to another disk! The entry program runs very quickly and once you get the hang of it, you will wonder how you ever did it the manual way.

Program Listings

Menu

```
10 'CASH INDEX 8/1/79
20 CLEAR 100
30 CLS
40 PRINT CHR$(23);
50 PRINT TAB(6) "CASH RECORD SYSTEM"
60 PRINT
70 PRINT
80 FOR I=1 TO 8
90 READ A$
100 PRINTI; A$
110 NEXT I
120 PRINT
130 PRINT
140 INPUT "ACTION ";A
150 FOR I=1 TO A
160 READ A$
170 NEXT I
180 RUN A$
190 DATA ENTRY,SUMMARY AND DETAIL,PRINT
    ACCOUNT ACTIVITY
200 DATA CHANGE RECORDS
210 DATA RE-COUNT ACCOUNTS,MOVE FILE TO
    NEW DISK
220 DATA CREATE NEW FILE,RESET FILE
230 DATA ENTRY,SUMMARY,ACTIVITY
240 DATA CHANGE,COUNTER,XFER,FILE,FRESET
```

Entry

```
10 'CASH ENTRY 8/12/79
20 CLEAR 2000
30 CLS
40 PRINT CHR$(23)
50 PRINT TAB(10) "CASH ENTRY"
60 PRINT
70 PRINT TAB(10) "ACCOUNT ";
80 INPUT A$
90 IF A$="END" THEN RUN "CASH"
100 DEFDBL A
110 DEFINT B,C,D,I,L,X
120 C1=0
130 B$=A$+"/DAT"
140 OPEN"R",1,B$
760 IF J>160 PRINT @ 0,"NEED NEW FILE";:INPUT A$
770 I=0
780 IF I2<64 THEN I2=64
790 PRINT @ 0, E$;
800 PRINT @ I2-64, E$
810 PRINT @ 20,N$; " CASH RECORD ";Y
820 PRINT TAB(8) "INFLOWS"; TAB(42) "OUTFLOWS"
830 FI=0
840 I1=0
850 I2=0
860 I3=X
870 I4=LE
880 IF X>6 THEN I1=INT((X+1)/2): I3=I1
890 IF LE-X>6 THEN I2=INT((LE-X+1)/2): I4=I2+X
900 IA=0
910 IB=X
920 II=0
930 IA=0
940 IB=X
950 II=0
960 II=II+1
970 IA=IA+1
980 IF IA>X GOTO 1040
990 IF IA>I1 AND I1>0 GOTO 1010
1000 PRINT II; B1$(II);
1010 IF I1=0 GOTO 1040
1020 IF IA+I1>X GOTO 1040
1030 PRINT TAB(16) II+I1; B1$(II+I1);
1040 IB=IB+1
1050 IF IB>LE GOTO 1110
1060 IF IB>X+I2 AND I2>0 GOTO 1080
1070 PRINT TAB(32) II+X; B1$(II+X);
1080 IF I2=0 GOTO 1110
1090 IF IB+I2>LE GOTO 1110
1100 PRINT TAB(48) II+X+I2; B1$(II+X+I2);
1110 PRINT
1120 IF IA<I3 OR IB<I4 GOTO 960
1130 IF I1=0 THEN I1=X
1140 IF I2=0 THEN I2=LE-X
1150 IX=IA
1160 IF IB-X>IX THEN IX=IB-X
1170 IA=I1
1180 IB=I2
1190 I1=5
1200 I2=IA
1210 IF IB<IA THEN I1=40: I2=IB: IB=IA
1220 FOR I4=1 TO IB+1
1230 FOR I3=0 TO 2
1240 SET(60,I4*3+I3)
1250 NEXT I3
1260 NEXT I4
1270 I2=(I2+2)*64+I1
1280 PRINT @ I2, "BANK ACCOUNTS";
1290 FOR II=1 TO BS
1300 I2=I2+64
1310 PRINT @ I2, II; A1$(II); "      ";
1320 NEXT II
1330 I2=I2-I1+64
1340 IX=IX*64
1350 IF IX+128>I2 THEN I2=IX+128
1970 PRINT#2,DA$
1980 PRINT#2,Y
1990 PRINT#2,DE$
2000 PRINT#2,AM
2010 C1=1
2020 I=I+1
2030 PRINT @ 960, E$
2040 GOTO 730
2050 'SUB TO INPUT
2060 A$=""
2070 PRINT CHR$(14);
2080 A1$=INKEY$
2090 IF A1$="" GOTO 2080
2100 IF ASC(A1$)<>8 GOTO 2150
2110 IF LEN(A$)<1 GOTO 2080
2120 A$=LEFT$(A$,LEN(A$)-1)
2130 PRINT CHR$(8);
2140 GOTO 2080
2150 IF ASC(A1$)<>9 OR IQ=0 GOTO 2190
2160 IQ=LEN(A$)+1
2170 IF IQ>LEN(DE$) OR IQ<1 GOTO 2220
2180 A1$=MID$(DE$,IQ,1)
2190 IF ASC(A1$)=13 PRINT CHR$(15);: RETURN
2200 A$=A$+A1$
2210 PRINT A1$;
2220 GOTO 2080
2230 'WRITE END OF FILE MARKER
2240 GOSUB 700
2250 LSET D1$="END"
2260 PUT 1,J
2270 'WRITE FIRST RECORD
2280 IY=0
2290 GOSUB 430
2300 LSET Y$=MKI$(Y)
2310 FOR II=1 TO BS+LE
2320 GOSUB 450
2330 LSET S$=MKD$(A(II))
2340 IY=IY+1
2350 NEXT II
2360 PUT1,4
2370 CLOSE
2380 IF C1=1 GOTO 2500
2390 GOTO 20
2400 'SUB TO INPUT A$
2410 PRINT CHR$(14);
2420 A$=INKEY$
2430 IF A$="" GOTO 2420
2440 IF ASC(A$)=13 GOTO 2480
2450 PRINT A$;
2460 LINEINPUT A1$
2470 A$=A$+A1$
2480 PRINT CHR$(15)
2490 RETURN
2500 'WRITE CHECKS
2510 CLS
2520 CLEAR 200
2530 INPUT "SIZE OF CHECKS (L/S/N) ";Q$
2540 IF Q$="N" C1=0: GOTO 20
2550 DEFDBL A,B
2560 DEFINT I
2570 F$="**##,###.##"
```

```
150 OPEN "O",2,"CHECKS"
160 FIELD #1,2 AS A1$,2 AS A2$,2 AS A3$
170 GET 1,1
180 BS=CVI(A1$):LE=CVI(A2$):X=CVI(A3$)
190 'BS IS NUMBER OF BANK ACCOUNTS
200 'LE IS NUMBER OF CATEGORIES
210 'X IS LAST INFLOW ACCOUNT
220 DIM A(BS+LE+1),A1$(BS),B1$(LE)
230 P$="###,###.##"
240 E$=CHR$(30)
250 N$=A$
260 CLS
270 FIELD #1,255 AS A3$
280 GET 1,2
290 FOR I=1 TO BS
300 FIELD #1, (I-1)*10 AS A1$,10 AS A2$
310 I1=10
320 IF MID$(A2$,I1,1)=" " THEN I1=I1-1: GOTO 320
330 A1$(I)=LEFT$(A2$,I1)
340 NEXT I
350 FIELD #1, 255 AS A3$
360 GET 1,3
370 FOR I=1 TO LE
380 FIELD #1, (I-1)*10 AS A1$,10 AS A2$
390 B1$(I)=A2$
400 NEXT
410 'A1$ HOLDS ACCOUNTS, B1$ HOLDS CATEGORIES
420 GOTO 470
430 'SUB TO FIELD #1
440 FIELD 1, 2AS Y$
450 FIELD 1, IY*8+2AS D$, 8AS S$
460 RETURN
470 IY=0
480 GOSUB 430
490 GET 1,4
500 Y=CVI(Y$)
510 FOR I=1 TO BS+LE
520 GOSUB 450
530 A(I)=CVD(S$)
540 IY=IY+1
550 NEXT I
560 J=LOF(1)
570 'GET LAST RECORD
580 I=0
590 GOSUB 700
600 GET 1,J
610 GOSUB 700
620 A$=D1$
630 IF LEFT$(A$,3)="END" GOTO 780
640 I=I+1
650 IF I<5 GOTO 610
660 J=J+1
670 I=0
680 GOTO 780
690 STOP
700 'SUBROUTINE TO FIELD #1
710 FIELD1, I*48AS DU$,5AS D1$,30AS D2$,2AS
    BANK$,2AS CAT$,8AS AMT$
720 RETURN
730 IF I<5 GOTO 780
740 PUT 1,J
750 J=J+1
1360 PRINT @ I2, "DATE"; TAB(7) "DESCRIPTION";
     TAB(25) "BANK";
1370 PRINT TAB(33) "CATEGORY"; TAB(42) "AMOUNT";
1380 PRINT TAB(53) "BAL"; TAB(60) "Y/N";
1390 FOR I1=1 TO BS
1400 PRINT @ 960+(I1-1)*63/BS,A1$(I1);
1410 PRINT USING P$; A(I1);
1420 NEXT I1
1430 K=896
1440 PRINT @ K, E$;
1450 IQ=0
1460 GOSUB 2050
1470 IF A$<>"" DA$=A$
1480 IF DE>X THEN AM=-AM
1490 IF DA$="END" GOTO 2230
1500 PRINT @ K, DA$;
1510 K=K+7
1520 PRINT @ K,;
1530 IQ=1
1540 GOSUB 2050
1550 IF A$<>"" DE$=A$
1560 PRINT @ K,DE$;
1570 K=K+18
1580 PRINT @ K,;
1590 IQ=0
1600 GOSUB 2050
1610 IF A$<>"" BN=VAL(A$)
1620 IF BN<1 OR BN>BS GOTO 1580
1630 PRINT @ K,A1$(BN);
1640 K=K+8
1650 PRINT @ K,;
1660 GOSUB 2050
1670 IF A$<>"" DE=VAL(A$)
1680 IF DE<1 OR DE>LE GOTO 1650
1690 PRINT @ K,B1$(DE);
1700 K=K+9
1710 PRINT @ K,;
1720 GOSUB 2050
1730 IF A$<>"" AM=VAL(A$)
1740 PRINT @ K-1,AM;
1750 K=K+8
1760 IF DE>X THEN AM=-AM
1770 A(BN)=A(BN)+AM
1780 A(DE+BS)=A(DE+BS)+AM
1790 PRINT @K-1,;
1800 PRINT USING P$;A(BN);
1810 K=K+11
1820 PRINT @ K,;
1830 GOSUB 2050
1840 IF A$<>"N" GOTO 1880
1850 A(BN)=A(BN)-AM
1860 A(DE+BS)=A(DE+BS)-AM
1870 GOTO 1430
1880 IF A$<>"Y" GOTO 1820
1890 GOSUB 700
1900 LSET D1$=DA$
1910 LSET D2$=DE$
1920 LSET BANK$=MKI$(BN)
1930 LSET CAT$=MKI$(DE)
1940 LSET AMT$=MKD$(AM)
1950 'WRITE CHECKS
1960 IF DE<=X GOTO 2020
2580 DATA ONE,TWO,THREE,FOUR,FIVE,SIX,SEVEN,
     EIGHT,NINE,TEN
2590 DATA ELEVEN,TWELVE,THIRTEEN,FOURTEEN,
     FIFTEEN,SIXTEEN
2600 DATA SEVENTEEN,EIGHTEEN,NINETEEN,TWENTY,
     THIRTY
2610 DATA FORTY,FIFTY,SIXTY,SEVENTY,EIGHTY,
     NINETY
2620 DATA HUNDRED,THOUSAND
2630 DIM N$(29)
2640 FOR I=1 TO 29
2650 READ N$(I)
2660 NEXT I
2670 OPEN "I",1,"CHECKS"
2680 A$=B$
2690 C$=D$
2700 A=B+.0005
2710 IF EOF(1) GOTO 2740
2720 INPUT#1,B$,Y,D$,B
2730 B=ABS(B)
2740 IF A$="" AND C$="" GOTO 2880
2750 CLS
2760 PRINT A$;" ";C$;" ";
2770 PRINT USING F$; A
2780 PRINT B$;" ";D$;" ";
2790 PRINT USING F$; B
2800 PRINT "1  WRITE"
2810 PRINT "2  NEXT CHECK (ADD)"
2820 PRINT "3  IGNORE"
2830 PRINT "4  END"
2840 INPUT E
2850 IF E<1 OR E>4 GOTO 2840
2860 ON E GOTO 2890 , 2870 , 2880 , 3600
2870 B=B+A
2880 GOTO 2680
2890 'WRITE CHECK
2900 PRINT "OLD PAYEE--";C$
2910 PRINT "PAYEE  ";CHR$(14);
2920 C1$=""
2930 A1$=INKEY$
2940 IF A1$="" GOTO 2930
2950 H=ASC(A1$)
2960 IF H=10 GOTO 2930
2970 IF H=13 PRINT CHR$(15);: GOTO 3090
2980 IF H<65 OR H>127 GOTO 3040
2990 'SWITCH UPPER-LOWER CASE
3000 IF H<91 A1$=CHR$(H+32) ELSE A1$=CHR$(H-32)
3010 PRINT A1$;
3020 C1$=C1$+A1$
3030 GOTO 2930
3040 IF H<>8 GOTO 3010
3050 IF LEN(C1$)<1 GOTO 2930
3060 C1$=LEFT$(C1$,LEN(C1$)-1)
3070 PRINT A1$;
3080 GOTO 2930
3090 'CONTINUE
3100 IF C1$<>"" THEN C$=C1$
3110 LPRINT
3120 LPRINT
3130 T=0
```

```
3140 IF Q$="S" GOTO 3180
3150 LPRINT
3160 T=22
3170 LPRINT
3180 LPRINT TAB(32+T) A$; TAB(38+T) Y-1900
3190 LPRINT
3200 T1=T
3210 IF T1=0 T1=5
3220 T2=T1
3230 IF T2=T THEN T2=T2+3
3240 LPRINT TAB(T1) C$; TAB(32+T2);
3250 LPRINT USING F$; A
3260 LPRINT
3270 'WRITE OUT AMOUNT
3280 IF T>0 T1=14 ELSE T1=0
3290 LPRINT TAB(T1)"**";
3300 I2=0
3310 IF A>=1000000 PRINT "YOU DO IT!":STOP
3320 I=6
3330 I3=A/(10[(I+1))+.001
3340 A1=A-I3*(10[(I+1))+.001
3350 II=A1/(10[I)
3360 IF II=0 AND I2=0 GOTO 3390
3370 IF I=4 OR I=1 GOTO 3470
3380 LPRINT N$(II+I2);" ";
3390 I2=0
3400 IF A<10[I-.001 GOTO 3500
3410 IF I<>3 GOTO 3450
3420 LPRINT N$(29);" ";
3430 I3=A/1000+.001
3440 A=A-I3*1000
3450 IF I=2 OR I=5 LPRINT N$(28);" ";
3460 GOTO 3500
3470 'TENS
3480 IF II>1 THEN I2=18: GOTO 3380
3490 I2=10
3500 I=I-1
3510 IF I>=0 GOTO 3330
3520 A1=A-INT(A)
3530 II=A1*100+.01
3540 LPRINT "AND ";
3550 C1$="##"
3560 IF II<10 THEN C1$="#"
3570 LPRINT USING C1$;II;
3580 LPRINT "/100**"
3590 GOTO 2680
3600 CLOSE
3610 GOTO 20
```

Summary and Detail

```
10 'CASH SUMMARY 7/9/79
20 CLEAR 17000
30 CLS
40 PRINT CHR$(23)
50 PRINT TAB(10) "CASH SUMMARY"
660 NEXT
670 FOR J=1 TO X
680 PRINT @ 64+J*64, J; TAB(4); B1$(J); TAB(15);
690 PRINT USING P$; A(J+BS);
700 NEXT
710 PRINT @ 980,;
720 PRINT "DETAIL ('END' TO STOP) ";
730 I5=0
740 GOSUB 1450
750 J$=A$
760 J1$=""
770 S=INSTR(A$,"&")
780 IF S=0 GOTO 830
790 J$=LEFT$(A$,S-1)
800 IF RIGHT$(J$,1)=" " THEN J$=LEFT$(J$,LEN
    (J$)-1): GOTO 800
810 J1$=RIGHT$(A$,LEN(A$)-S)
820 IF LEFT$(J1$,1)=" " THEN J1$=RIGHT$(J1$,
    LEN(J1$)-1): GOTO 820
830 IF J$="END" GOTO 20
840 J=VAL(J$)
850 IFJ=0GOTO 870
860 IF J<1 OR J>LE GOTO 720
870 IF I2<>-1 GOTO 1100
880 DIM D$(850), DE$(850), BN(850), C(850), AM(850)
890 I1=5
900 S$="    "
910 I2=0
920 I=0
930 GOSUB 520
940 GET 1,I1
950 FOR I=0 TO 4
960 GOSUB 520
970 IF LEFT$(D1$,3)="END"CLOSE:I2=I2-1:GOTO 1100
980 D3$=D2$
990 I4=INSTR(D3$,S$)
1000 IF I4>0 THEN D3$=LEFT$(D3$,I4).
1010 D$(I2)=D1$
1020 DE$(I2)=D3$
1030 BN(I2)=CVI(BANK$)
1040 C(I2)=CVI(CAT$)
1050 AM(I2)=CVD(AMT$)
1060 I2=I2+1
1070 NEXT
1080 I1=I1+1
1090 GOTO 920
1100 'SEARCH ARRAYS
1110 K=0
1120 CLS
1130 IF J>0 PRINT @ 20, B1$(J) ELSE PRINT @ 20, J$
1140 IF J1$<>"" PRINT @ 32, "& ";J1$
1150 A=0
1160 FOR I3=0 TO I2
1170 IF J$=" " GOTO 1260
1180 IF J=0 GOTO 1250
1190 IF C(I3)<>J GOTO 1380
1200 IF J1$="" GOTO 1220
1210 IF INSTR(DE$(I3),J1$)=0 GOTO 1380
1220 PRINT D$(I3);TAB(7); DE$(I3);TAB(40) A1$(BN
    (I3));TAB(50);
1230 PRINT USING P$; AM(I3)
```

Print Account Activity

```
10 ' PRINT ACCOUNT ACTIVITY 8/17/79
20 CLEAR 7500
30 IB=0
40 CLS
50 PRINT CHR$(23)
60 PRINT @ 10, "PRINT ACCOUNT ACTIVITY"
70 PRINT
80 PRINT
90 PRINT TAB(10) "ACCOUNT ";
100 INPUT A$
110 IF A$="END" THEN RUN "CASH"
120 INPUT "TITLE TO PRINT ";T1$
130 INPUT "DATE TO PRINT ";T2$
140 DEFDBL A
150 DEFINT B,C,D,I,L,X
160 B$=A$+"/DAT"
170 OPEN"R",1,B$
180 FIELD #1,2 AS A1$,2 AS A2$,2 AS A3$
190 GET 1,1
200 BS=CVI(A1$)
210 LE=CVI(A2$)
220 X=CVI(A3$)
230 DIM A(BS+LE+1),A1$(BS),B1$(LE)
240 P$="+###,###.##"
250 E$=CHR$(30)
260 N$=A$
270 CLS
280 FIELD #1,255 AS A3$
290 GET 1,2
300 FOR I=1 TO BS
310 FIELD #1, (I-1)*10 AS A1$,10 AS A2$
320 I1=10
330 IF MID$(A2$,I1,1)=" " THEN I1=I1-1: GOTO 330
340 A1$(I)=LEFT$(A2$,I1)
350 NEXT
360 FIELD #1, 255 AS A3$
370 GET 1,3
380 FOR I=1 TO LE
390 FIELD #1, (I-1)*10 AS A1$,10 AS A2$
400 B1$(I)=A2$
410 NEXT
420 'A1$ HOLDS ACCOUNTS, B1$ HOLDS CATEGORIES
430 GOTO 480
440 'SUB TO FIELD #1
450 FIELD 1, 2AS Y$
460 FIELD 1, IY*8+2AS D$, 8AS S$
470 RETURN
480 IY=0
490 GOSUB 440
500 GET 1,4
510 Y=CVI(Y$)
520 FOR I=1 TO BS+LE
```

```
60 PRINT
70 PRINT TAB(10) "ACCOUNT ";
80 INPUT A$
90 IF A$="END" THEN RUN "CASH"
100 DEFDBL A
110 DEFINT B,C,D,I,L,X
120 B$=A$+"/DAT"
130 OPEN"R",1,B$
140 FIELD #1,2 AS A1$,2 AS A2$,2 AS A3$
150 GET 1,1
160 BS=CVI(A1$):LE=CVI(A2$):X=CVI(A3$)
170 DIM A(BS+LE+1),A1$(BS),B1$(LE)
180 P$="###,###.##"
190 E$=CHR$(30)
200 N$=A$
210 CLS
220 FIELD #1,255 AS A3$
230 GET 1,2
240 FOR I=1 TO BS
250 FIELD #1, (I-1)*10 AS A1$,10 AS A2$
260 I1=10
270 IF MID$(A2$,I1,1)=" " THEN I1=I1-1: GOTO 270
280 A1$(I)=LEFT$(A2$,I1)
290 NEXT
300 FIELD #1, 255 AS A3$
310 GET 1,3
320 FOR I=1 TO LE
330 FIELD #1, (I-1)*10 AS A1$,10 AS A2$
340 B1$(I)=A2$
350 NEXT
360 'A1$ HOLDS ACCOUNTS, B1$ HOLDS CATEGORIES
370 GOTO 420
380 'SUB TO FIELD #1
390 FIELD 1, 2AS Y$
400 FIELD 1, IY*8+2AS D$, 8AS S$
410 RETURN
420 IY=0
430 GOSUB 380
440 GET 1,4
450 Y=CVI(Y$)
460 FOR I=1 TO BS+LE
470 GOSUB 400
480 A(I)=CVD(S$)
490 IY=IY+1
500 NEXT I
510 GOTO 550
520 'SUBROUTINE TO FIELD #1
530 FIELD1, I*48AS DU$,5AS D1$,30AS D2$,2AS
    BANK$,2AS CAT$,8AS AMT$
540 RETURN
550 I2=-1
560 CLS
570 FOR J=1 TO BS
580 PRINT TAB((J-1)*63/BS) A1$(J);
590 PRINT USING P$; A(J);
600 NEXT J
610 PRINT
620 PRINT TAB(10) "INCOME"; TAB(50) "OUTFLOW"
630 FOR J=X+1 TO LE
640 PRINT TAB(35) J; TAB(40) B1$(J); TAB(51);
650 PRINT USING P$; -A(J+BS)
1240 GOTO 1290
1250 IF INSTR(DE$(I3),J$)=0 GOTO 1380
1260 PRINT D$(I3); TAB(7) DE$(I3); TAB(31) A1$(
     BN(I3));
1270 PRINT TAB(41) B1$(C(I3)); TAB(50);
1280 PRINT USING P$; AM(I3)
1290 K=K+1
1300 A=A+AM(I3)
1310 IF K<14 GOTO 1380
1320 PRINT "ENTER WHEN READY ('END' TO STOP) ";
1330 I5=1
1340 GOSUB 1450
1350 K=0
1360 IF A$="END" A$="": GOTO 560
1370 CLS
1380 NEXT
1390 PRINT TAB(10) "TOTAL"; TAB(50);
1400 PRINT USING P$; A
1410 PRINT "DONE ";
1420 I5=1
1430 GOSUB 1450
1440 GOTO 560
1450 'SUB TO INPUT A$
1460 PRINT CHR$(14);
1470 A$=INKEY$
1480 IF A$="" GOTO 1470
1490 IF ASC(A$)=13 GOTO 1570
1500 IF A$<>"p" GOTO 1540
1510 GOSUB 1590
1520 A$=""
1530 IF I5=1 GOTO 1570
1540 PRINT A$;
1550 LINEINPUT A1$
1560 A$=A$+A1$
1570 PRINT CHR$(15)
1580 RETURN
1590 'PRINT SCREEN
1600 PRINT CHR$(15);
1610 LPRINT TAB(20) LEFT$(B$,3),Y
1620 LPRINT
1630 LPRINT
1640 FOR I4=1 TO 15
1650 A2$=""
1660 K3=15360+(I4-1)*64
1670 FOR I5=0 TO 63
1680 A2$=A2$+CHR$(PEEK(K3+I5))
1690 NEXT I5
1700 LPRINT A2$
1710 A2$=INKEY$
1720 IF A2$<>"" LPRINT: RETURN
1730 NEXT I4
1740 A$=""
1750 RETURN
530 A(I)=0
540 NEXT I
550 IB=IB+1
560 INPUT "NEW PAGE ";J$
570 LPRINT TAB(30) T1$
580 LPRINT TAB(30) T2$
590 LPRINT
600 LPRINT TAB(30) A1$(IB); " ACCOUNT"
610 LPRINT
620 LPRINT
630 LPRINT "DATE";TAB(7) "DESCRIPTION";TAB(30)
    "CATEGORY";
640 LPRINT TAB(40);"WITHDRAWAL";TAB(56)
    "DEPOSIT";
650 LPRINT TAB(63);"      BALANCE"
660 LPRINT
670 GOTO 710
680 'SUBROUTINE TO FIELD #1
690 FIELD1, I*48AS DU$,5AS D1$,30AS D2$,2AS
    BANK$,2AS CAT$,8AS AMT$
700 RETURN
710 'READY TO READ AND TOTAL
720 J=4
730 J=J+1
740 I=0
750 GOSUB 680
760 GET 1,J
770 GOSUB 680
780 IF LEFT$(D1$,3)="END" GOTO 1000
790 A=CVD(AMT$)
800 D=CVI(CAT$)
810 B=CVI(BANK$)
820 IF B<>IB GOTO 940
830 S=INSTR(D2$,"  ")
840 IF S=0 GOTO 860
850 D2$=LEFT$(D2$,S)
860 LPRINT D1$;TAB(7) D2$;TAB(30) B1$(D);
870 IQ=53
880 IF A<0 THEN IQ=40
890 LPRINT TAB(IQ);
900 LPRINT USING "###,###.##"; A;
910 LPRINT TAB(63);
920 LPRINT "   ";
930 LPRINT USING "###,###.##"; A(B)+A
940 A(B)=A(B)+A
950 A(D+BS)=A(D+BS)+A
960 I=I+1
970 IF I<5 GOTO 770
980 J=J+1
990 GOTO 740
1000 'DONE READING
1010 IF IB<BS GOTO 520
1020 GOTO 20
```

Change Records

```
10 'CHANGE RECORDS 8/31/79
20 CLEAR 7500
30 CLS
40 PRINT CHR$(23)
50 PRINT @ 10, "CHANGE RECORDS"
60 PRINT
70 PRINT
80 PRINT TAB(10) "ACCOUNT ";
90 INPUT A$
110 IF A$="END" THEN RUN "CASH"
120 DEFDBL A
130 DEFINT B,C,D,I,L,X
140 B$=A$+"/DAT"
150 OPEN"R",1,B$
160 FIELD #1,2 AS A1$,2 AS A2$,2 AS A3$
170 GET 1,1
180 BS=CVI(A1$)
190 LE=CVI(A2$)
200 X=CVI(A3$)
210 DIM A(BS+LE+1),A1$(BS),B1$(LE)
220 P$="+###,###.##"
230 E$=CHR$(30)
240 N$=A$
250 CLS
260 FIELD #1,255 AS A3$
270 GET 1,2
280 FOR I=1 TO BS
290 FIELD #1, (I-1)*10 AS A1$,10 AS A2$
300 I1=10
310 IF MID$(A2$,I1,1)=" " THEN I1=I1-1: GOTO 310
320 A1$(I)=LEFT$(A2$,I1)
330 NEXT
340 FIELD #1, 255 AS A3$
350 GET 1,3
360 FOR I=1 TO LE
370 FIELD #1, (I-1)*10 AS A1$,10 AS A2$
380 B1$(I)=A2$
390 NEXT
400 'A1$ HOLDS ACCOUNTS, B1$ HOLDS CATEGORIES
410 GOTO 460
420 'SUB TO FIELD #1
430 FIELD 1, 2AS Y$
440 FIELD 1, IY*8+2AS D$, 8AS S$
450 RETURN
460 IY=0
470 GOSUB 420
480 GET 1,4
490 Y=CVI(Y$)
500 FOR I=1 TO BS+LE
510 GOSUB 440
520 A(I)=CVD(S$)
530 IY=IY+1
540 NEXT I
```

Recount Accounts

```
10 ' COUNTER 8/30/79
20 CLEAR 7500
30 CLS
40 PRINT CHR$(23)
50 PRINT @ 10, "COUNTER"
60 PRINT
70 PRINT
80 PRINT TAB(10) "ACCOUNT ";
90 INPUT A$
100 IF A$="END" THEN RUN "CASH"
110 DEFDBL A
120 DEFINT B,C,D,I,L,X
130 B$=A$+"/DAT"
140 OPEN"R",1,B$
150 FIELD #1,2 AS A1$,2 AS A2$,2 AS A3$
160 GET 1,1
170 BS=CVI(A1$)
180 LE=CVI(A2$)
190 X=CVI(A3$)
200 DIM A(BS+LE+1),A1$(BS),B1$(LE)
210 P$="+###,###.##"
220 E$=CHR$(30)
230 N$=A$
240 CLS
250 FIELD #1,255 AS A3$
260 GET 1,2
270 FOR I=1 TO BS
280 FIELD #1, (I-1)*10 AS A1$,10 AS A2$
290 I1=10
300 IF MID$(A2$,I1,1)=" " THEN I1=I1-1: GOTO 300
310 A1$(I)=LEFT$(A2$,I1)
320 NEXT I
330 FIELD #1, 255 AS A3$
340 GET 1,3
350 FOR I=1 TO LE
360 FIELD #1, (I-1)*10 AS A1$,10 AS A2$
370 B1$(I)=A2$
380 NEXT
390 'A1$ HOLDS ACCOUNTS, B1$ HOLDS CATEGORIES
400 GOTO 450
410 'SUB TO FIELD #1
420 FIELD 1, 2AS Y$
430 FIELD 1, IY*8+2AS D$, 8AS S$
440 RETURN
450 IY=0
460 GOSUB 410
470 GET 1,4
480 Y=CVI(Y$)
490 FOR I=1 TO BS+LE
500 A(I)=0
510 NEXT I
520 GOTO 560
530 'SUBROUTINE TO FIELD #1
```

```
80 FOR I=1 TO J
90 IF J<1 STOP
100 FIELD 1,255 AS D$
110 GET1,I
120 D$(I)=D$
130 NEXT I
140 CLOSE
150 INPUT "NEW DISK";D$
160 OPEN "R",1,A$
170 FOR I=1 TO J
180 FIELD 1,255 AS D$
190 LSET D$=D$(I)
200 PUT 1,I
210 NEXT I
220 CLOSE
230 RUN "CASH"
```

Create New File

```
10 'FILE WRITE 8/6/79
20 CLEAR 7500
30 CLS
40 PRINT"NEW FILE CREATION"
50 PRINT TAB(10) "ACCOUNT ";
60 INPUT A$
70 DEFINT B,C,D,I,L,X,Y
80 B$=A$+"/DAT"
90 OPEN"R",1,B$
100 FIELD #1,2 AS A1$,2 AS A2$,2 AS A3$
110 INPUT "NUMBER OF BANK ACCOUNTS";BS
120 INPUT "NUMBER OF CATEGORIES ";LE
130 INPUT "LAST INFLOW ACCOUNT ";X
140 LSET A1$=MKI$(BS):LSET A2$=MKI$(LE):LSET
    A3$=MKI$(X)
150 PUT 1,1
160 DIM A1$(BS),B1$(LE)
170 FOR I=1 TO BS
180 PRINT "ACCOUNT NUMBER ";I;
190 INPUT A1$(I)
200 NEXT I
210 FOR I=1 TO LE
220 PRINT "CATEGORY NUMBER ";I;
230 INPUT B1$(I)
240 NEXT I
250 FOR I=1 TO BS
260 FIELD #1, (I-1)*10 AS A1$,10 AS A2$
270 LSET A2$=A1$(I)
280 NEXT
290 PUT 1,2
300 FOR I=1 TO LE
310 FIELD #1, (I-1)*10 AS A1$,10 AS A2$
320 LSET A2$=B1$(I)
330 NEXT
```

```
550 J=5
560 'GET RECORD J
570 I=0
580 GOSUB 930
590 GET 1,J
600 GOSUB 930
610 IF LEFT$(D1$,3)="END" CLOSE: GOTO 20
620 BN=CVI(BANK$)
630 DE=CVI(CAT$)
640 AM=CVD(AMT$)
650 F=0
660 PRINTD1$;" ";D2$;TAB(40)A1$(BN);" ";B1$
    (DE);" ";AM
670 DA$=D1$:DE$=D2$
680 PRINT"CORRECT (Y/N) ";
690 INPUT A$
700 IF A$="END" CLOSE: GOTO 20
710 IF A$="Y" AND F=-1 GOTO 960
720 AN=INT(VAL(A$)/5)
730 IF AN=0 GOTO 780
740 J=J+AN
750 IF J<2 THEN J=2
760 IF J>LOF(1) THEN J=LOF(1)-1
770 GOTO 560
780 IF A$<>"N" GOTO 880
790 INPUT "DATE";D1$
800 INPUT "DESCRIPTION";D2$
810 FORI5=1 TO LE
820 PRINT I5; B1$(I5),;
830 NEXT I5
840 INPUT "CATEGORY";DE
850 INPUT "AMOUNT";AM
860 F=-1
870 GOTO 660
880 I=I+1
890 IF I<5 GOTO 600
900 J=J+1
910 GOTO 570
920 STOP
930 'SUBROUTINE TO FIELD #1
940 FIELD1, I*48AS DU$,5AS D1$,30AS D2$,2AS
    BANK$,2AS CAT$,8AS AMT$
950 RETURN
960 GOSUB 930
970 LSET D1$=DA$
980 LSET D2$=DE$
990 LSET BANK$=MKI$(BN)
1000 LSET CAT$=MKI$(DE)
1010 LSET AMT$=MKD$(AM)
1020 PUT 1,J
1030 GOTO 880
```



```
540 FIELD1, I*48AS DU$,5AS D1$,30AS D2$,2AS
    BANK$,2AS CAT$,8AS AMT$
550 RETURN
560 'READY TO READ AND TOTAL
570 J=4
580 J=J+1
590 I=0
600 GOSUB 530
610 GET 1,J
620 GOSUB 530
630 IF LEFT$(D1$,3)="END" GOTO 740
640 A=CVD(AMT$)
650 D=CVI(CAT$)
660 B=CVI(BANK$)
670 PRINT D1$; " ";D2$; A1$(B); "  ";B1$(D);
    "  "; A
680 A(B)=A(B)+A
690 A(D+BS)=A(D+BS)+A
700 I=I+1
710 IF I<5 GOTO 620
720 J=J+1
730 GOTO 590
740 'DONE READING
750 PRINT
760 PRINT "ACCOUNT BALANCES"
770 FOR II=1 TO BS+LE
780 PRINT USING P$; A(II);
790 NEXT II
800 INPUT "DONE ";A$
810 Y=1979
820 'WRITE FIRST RECORD
830 IY=0
840 GOSUB 410
850 GET 1,4
860 GOSUB 410
870 LSET Y$=MKI$(Y)
880 FOR II=1 TO BS+LE
890 GOSUB 430
900 LSET S$=MKD$(A(II))
910 IY=IY+1
920 NEXT II
930 PUT 1,4
940 CLOSE
950 GOTO 20
```

Move File to New Disc

```
10 'TRANSFER CASH FILES
20 CLEAR 20000
30 DIM D$(200)
40 INPUT "FILE NAME";A$
50 A$=A$+"/DAT"
60 OPEN"R",1,A$
70 J=LOF(1)
```

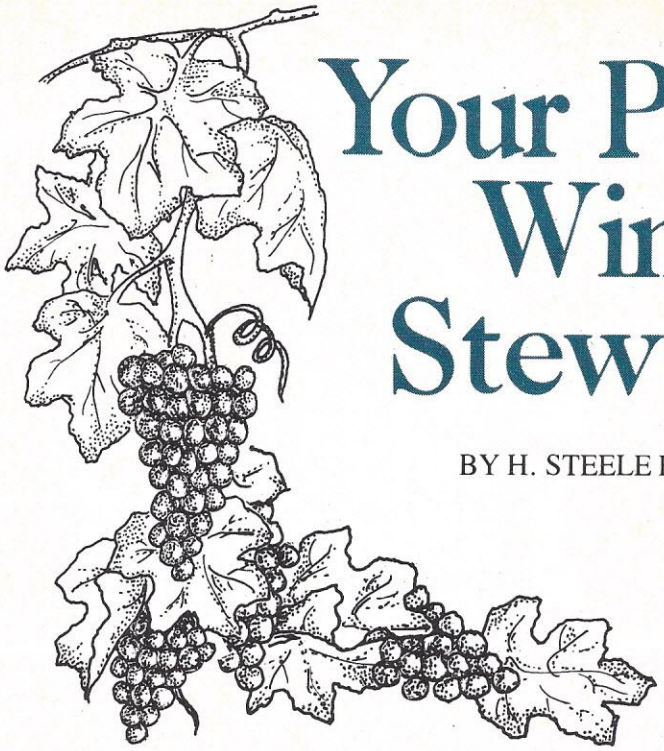
```
340 PUT1,3
350 'A1$ HOLDS ACCOUNTS, B1$ HOLDS CATEGORIES
360 GOTO 410
370 'SUB TO FIELD #1
380 FIELD 1, 2AS Y$
390 FIELD 1, IY*8+2AS D$, 8AS S$
400 RETURN
410 GOSUB 370
420 INPUT "YEAR ";Y
430 LSET Y$=MKI$(Y)
440 FOR I=1 TO BS+LE
450 GOSUB 390
460 LSET S$=MKD$(0)
470 IY=IY+1
480 NEXT I
490 PUT 1,4
500 I=0
510 GOSUB 560
520 LSET D1$="END"
530 PUT 1,5
540 CLOSE
550 RUN "CASH"
560 'SUBROUTINE TO FIELD #1
570 FIELD1, I*48AS DU$,5AS D1$,30AS D2$,2AS
    BANK$,2AS CAT$,8AS AMT$
580 RETURN
```

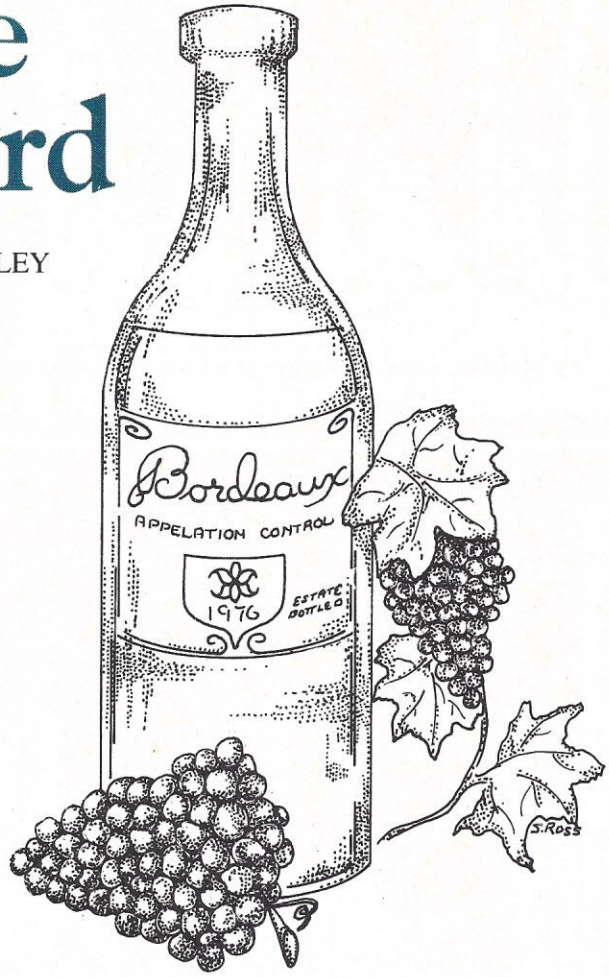
Reset File

```
10 'NEW FILE
20 INPUT "OLD ACCOUNT ";A$
30 INPUT "NEW ACCOUNT ";A1$
40 A$=A$+"/DAT"
50 A1$=A1$+"/DAT"
60 OPEN "R",1,A$
70 OPEN "R",2,A1$
80 FOR I=1 TO 4
90 FIELD #1,255 AS D$
100 GET 1,I
110 FIELD#2,255 AS D1$
120 LSET D1$=D$
130 PUT 2,I
140 NEXT I
150 FIELD #2,5 AS D$
160 LSET D$="END"
170 PUT 2,5
180 CLOSE
190 RUN "CASH"
```

Your Personal Wine Steward

BY H. STEELE HOLLEY





In the beginning, budding oinophiles visit a liquor store the afternoon before a special dinner to purchase an appropriate wine. Sooner or later they begin to keep a few bottles on hand. Although these bottles may be stored in a closet, in the basement, in the bedroom, or on a kitchen shelf, it's the start of a wine cellar.

Soon oinophiles discover advantages in maintaining a wine cellar other than the convenience of not having to go to the store each time they serve a wine. For instance, under certain circumstances, red wines will improve with storage; as these wines age they command high prices which can be avoided by buying the wines young. Also, with a number of bottles of wine on hand, a wine can be chosen to complement the dinner or occasion.

To make informed choices, oinophiles must know which wines are available in their cellar, and their impressions of similar wines tasted in the past.

This program, using Radio Shack's Level II BASIC, is designed to classify 100 different wines in 16K memory. Information on each wine is entered as a separate data statement beginning at line 5000 for Red Bordeaux, 5500 for red Burgundys, 6000 for Beaujolais, 6500 for Rhones, 6800 for French red wines, 7000 for Italian red wines, 7200 for Spanish red wines, 7300 for South American red wines, 7500 for American red wines and 7900 for other red wines. Roses begin at line 8000; white Rhine wines begin at 9000. Moselles begin at 9500, Chablis' at 10000, white Burgundys at 10500, Graves (white Bordeaux) at 11000, Loire at 11500, Alsace at 11800, Sauterne at 12000, white Italians at 12200, white Americans at 12500 and other whites at 12900. Champagnes are entered at 13000, fortified wines are entered at 15000 and an automatic end is read as a data statement at 18000 to exit from the read loop before 100 wines are entered.

Similar types of wines are entered together (i.e. Bordeaux from 5000 to 5500) so that when wines are listed, similar wines print out together for a comparison. Also, a wine data entry is easily found when information on it is changed.

Information on wines is listed as shown in Table 1.

Care must be taken to enter the information in the exact sequence and of the exact type, string or numeric requested. If the wine is non-vintage, a 0 must be entered as the second data entry. If the wine has not been drunk, a 0 must be entered as the sixth data entry. *If the wine has not been drunk, do not enter the seventh or eighth pieces of information G(X) and H(X), since the program will skip to the next line when it sees a 0 as date drunk.*

This program will allow oinophiles to list the following: all of the wines — both those remaining in the cellar and those that have been drunk; only those wines that have been drunk; only those wines remaining in the cellar; or only wines of a certain type (i.e., champagnes, Bordeaux, sauternes or American reds). Once they have requested a listing of the type of wine required, they can request a complete print-out of the wine by entering its number in the list (see Sample Run). By entering both wines that have been drunk and wines remaining in the cellar you can choose a suitable type of wine for the occasion, request full information on this wine, including its price and date of purchase, and then go back and list a similar type of wine that has been drunk to note the characteristics of that type of wine and its suitability for the occasion.

With this program, you can recall not only specific information on a wine but happy occasions in the past that were distinguished by good wine, good food and good company. Or, if you need a suitable wine to be decanted for Saturday with Ris de Veau a la Financiere, just load "Wine Cellar".

Illustration by Susan Ross

Table 1

VARIABLE	TYPE OF INFORMATION	EXAMPLE
A(X)"String"	A short (no more than 16 letters) listing of the wine for identification purposes.	Chateau D'yquem
B(X)	Vintage year (note 2).	1967
I(X)"String"	A complete description of the wine. It will appear when full information is requested for that wine.	Chateau D'yquem French Sauterne 1967
C(X)"String"	Type of wine (note 3).	Sauternes
D(X)	Price.	23.95
E(X)	Date purchased.	10.75
F(X)	Date drunk (note 4).	3.76
G(X)	Score (note 5).	20
H(X)	Comments on drinking (note 6).	Velvet — silky

Program Notes

1. If the descriptions of the wines are long, the program may run out of memory before 100 wines are entered. (I was able to enter 92 wines.) Additional memory can be obtained by deleting the REM statements or by using multiple data entry lines on the TRS-80.
2. If the wine is non-vintage, a 0 must be entered in this space.
3. Since the program uses this statement for string comparison, only the following statements may be used: Bordeaux, Burgundy, Beaujolais, Rhone, French Red, Italian Red, Spanish Red, S. American Red, American Red, Red (for other Reds), Rhine, Moselle, Chablis, Chardonnay, Graves, Loire, Sauternes, White Italian, White American, Other Wines, Champagne and Fortified Wine.
4. To enter dates, only numbers and one period may be entered; i.e., January, 1979 becomes 1.79. If you wish to enter the day of the month, i.e., January 23, 1979 — enter 1.2379. If the wine has not been drunk, *a 0 must be entered at this point,* so the computer will list this wine as remaining in the cellar. Do not enter the score or comments if the wine has not been drunk.
5. The score that I use lists 0 to 1 point for color; 0 to 1 point for clarity; 0, 1, or 2 points for body; 0 to 5 points for aroma; 0 to 5 points for taste; 0 to 2 points for aftertaste; and 0 to 4 points for general impression of the wine. The most that a wine can get, therefore, is 20 points. Anyone using the program can use their own score, which could be −4 to +4 for awful to great or any numerical type of scoring that may be devised. If the type of scoring is changed, line 1230 should be changed to indicate the type of scoring used.
6. Comments can either refer to the taste of the wine in your own words, i.e., bitter, sweet or fruity, or may refer to the occasion on which it was drunk: for example, with Mary on New Year's Eve. Any reference that recalls the taste and character of the wine to you is appropriate.
7. Since this is *your* Wine Cellar, H. Steele Holley in line 240 should be replaced with your name.
8. The wines listed as data from line 5000 on are examples only. They should be deleted and replaced by your wines. Enter your wines as string, number, string, string, number, number, number, number, string.
9. This program will handle approximately 100 wines. If your cellar and tasting experiences increase beyond 100, additional memory can be provided by an expansion interface. However, the program now takes 25 seconds to find a single wine in a category. A better solution is to alter the program to provide a separate listing of red wines, white wines and other wines.

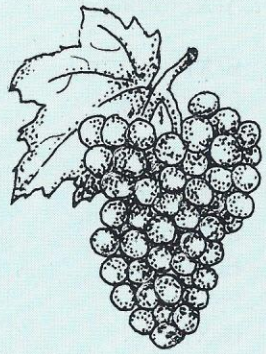
Program Listing

```
00 GOTO240
90 '5000=BORDEAUX,5500 BURGUNDY, 6000 BEAUJOLAIS, 6500 RHONE, 6000 FRENCH RED, 7
000 ITALIAN, 7200 SPANISH, 7300 SOUTH AMER 7500 AMERICAN 7900 OTHER
100 '8000=ROSE, 9000=WHITE RHINE,9500=MOSELLE,10000=CHABLIS,10500=BURGUNDY,11000
=GRAVES,11500=LOIRE,11800=ALSACE,12000=SAUTERNE,12200=WHITE ITALIAN,12500=AMERIC
AN WHITE,12900=OTHER WHITES
110 '13000=CHAMPAGNES
120 '15000=FORTIFIED WINES
130 'A$=WINE,B=YEAR,C$=TYPE, D=PRICE,I$=DESCRIPTION
140 'E=DATE PURCHASED, F=DATE DRUNK, G=SCORE, H$=COMMENTS
150 CLEAR200
160 DEFSTRA,C,H,I
170 DIMA(100),B(100),C(100),D(100),E(100),F(100),G(100),H(100),I(100)
180 FORX=1TO100
190 READA(X)
200 IFA(X)="END"GOTO260
210 READB(X),I(X),C(X),D(X),E(X),F(X)
220 IFF(X)<>0THENREADG(X),H(X)
230 NEXTX
240 CLS:PRINT:PRINT:PRINT:PRINTTAB(10)CHR$(23)"WINE CELLAR":PRINTTAB(5)"---- ---
---":PRINT@980,"H. STEELE HOLLEY"
250 GOTO130
260 CLS:PRINT:PRINT:PRINT"WHICH WINES DO YOU WISH TO SEE?
270 PRINT:PRINT"(1) ALL THE WINES
```

Continued

Program Listing continued

```
280 PRINT"(2) JUST THE WINES THAT HAVE BEEN DRUNK
290 PRINT"(3) JUST THE WINES THAT REMAIN
300 PRINT"(4) RED WINES
310 PRINT"(5) ROSE WINES
320 PRINT"(6) WHITE WINES
330 N=0:PRINT"(7) CHAMPAGNES AND SPARKLING WINES
340 PRINT"(8) FORTIFIED WINES":INPUTN
350 GOTO1000
360 CLS:PRINT:PRINT"WHICH RED WINES DO YOU WISH TO SEE?
370 N=0:PRINT
380 PRINT"(1) RED BORDEAUX
390 PRINT"(2) RED BURGUNDY
400 PRINT"(3) RED  BEAJOLAIS
410 PRINT"(4) RED RHONE
420 PRINT"(5) OTHER FRENCH REDS
430 PRINT"(6) ITALIAN REDS
440 PRINT"(7) SPANISH REDS
450 PRINT"(8) SOUTH AMERICAN REDS
460 PRINT"(9) AMERICAN REDS
470 N=0:PRINT"(10) OTHER RED WINES":INPUTN
480 IFN=0GOSUB1020 :GOTO360
490 N=N+10
500 GOTO690
510 GOSUB1020 :GOTO360
520 N=0:CLS:PRINT:PRINT"WHICH WHITE WINES DO YOU WISH TO SEE?
530 PRINT
540 PRINT"(1) RHINE
550 PRINT"(2) MOSELLE
560 PRINT"(3) CHABLIS
570 PRINT"(4) WHITE BURGUNDY AND PINOT CHARDONNAYS
580 PRINT"(5) GRAVES
590 PRINT"(6) LOIRE
600 PRINT"(7) ALSACE
610 PRINT"(8) SAUTERNES":N=0
620 PRINT"(9) WHITE ITALIAN
630 PRINT"(10) AMERICAN WHITES
640 PRINT"(11) OTHER WHITES":INPUTN
650 IFN=0GOSUB1020 :GOTO520
660 N=20+N:GOTO690
670 N=N+30:GOTO690
680 N=N+30:GOTO690
690 GOSUB1030 :FORX=1TO100
700 IFN=1GOTO1050
710 IF F(X) >1  AND N=2 GOTO1050
720 IFF(X)=0ANDN=3THEN1050
730 IFN=5 ANDLEFT$(C(X),3) ="ROS"GOTO1050
740 IFN=11 AND LEFT$(C(X),3)="BOR"GOTO1050
750 IFN=12 AND LEFT$(C(X),3)="BUR"GOTO1050
760 IFN=13 AND LEFT$(C(X),3)="BEA"GOTO1050
770 IFN=14AND LEFT$(C(X),3)="RHO"GOTO1050
780 IFN=15 ANDLEFT$( C(X),3)="FRE"GOTO1050
790 IFN=16ANDLEFT$(C(X),3)="ITA"GOTO1050
800 IFN=17ANDLEFT$(C(X),2)="SP"GOTO1050
810 IFN=18ANDLEFT$(C(X),3)="S.  "GOTO1050
820 IFN=19ANDLEFT$(C(X),3)="AME"GOTO1050
830 IFN=20ANDLEFT$(C(X),3)="RED"GOTO1050
840 IFN=21ANDLEFT$(C(X),3)="RHI"GOTO1050
850 IFN=22ANDLEFT$(C(X),3)="MOS"GOTO1050
860 IFN=23ANDLEFT$(C(X),4)="CHAB"GOTO1050
870 IFN=24ANDLEFT$(C(X),4)="CHAR"GOTO1050
880 IFN=25ANDLEFT$(C(X),3)="GRA"GOTO1050
890 IFN=26ANDLEFT$(C(X),3)="LOI"GOTO1050
900 IFN=27ANDLEFT$(C(X),3)="ALS"GOTO1050
910 IFN=28ANDLEFT$(C(X),3)="SAU"GOTO1050
920 IFN=29ANDLEFT$(C(X),7)="WHITE I"GOTO1050
930 IFN=30ANDLEFT$(C(X),7)="WHITE A"GOTO1050
940 IFN=31ANDLEFT$(C(X),3)="OTH"GOTO1050
950 IFN=37ANDLEFT$(C(X),4)="CHAM"GOTO1050
960 IFN=38ANDLEFT$(C(X),3)="FOR"GOTO1050
970 NEXTX
980 GOTO1090
990 CLS:PRINT:PRINT:PRINT:PRINTTAB(12)CHR$(23)"GOOD-BYE":FORX=1TO3000:NEXT:END
1000 ONNGOTO690 ,690 ,690 ,360 ,690 ,520 ,670 ,680
1010 GOSUB1020 :GOTO260
1020 CLS:PRINT:PRINT:PRINT:PRINT"READ THE DIRECTIONS, PLEASE, DUMMY!":FORX=1TO30
00:NEXT:RETURN
1030 CLS:PRINT"","WINE","YEAR","TYPE":PRINT"","----","-----","-----":RETURN
1040 GOSUB1030
1050 Q=Q+1:IFA(X)="END"GOTO1090
1060 PRINT"(";X;") ";A(X),B(X),C(X)
1070 IFQ=11THENINPUTAA:Q=0:GOSUB1030 :
1080 GOTO970
1090 PRINT:PRINT"TO SEE INDIVIDUAL DATA ON ANY WINE ENTER ITS NUMBER
1100 PRINT"TO SEE THE ORGINAL LIST ENTER 111: TO STOP ENTER 112"
1110 INPUTX
1120 IFX=111THENRUN
1130 IFX=112GOTO990
1140 GOTO1150
1150 CLS:PRINT"**************************************************************":PRI
NT"WINE",I(X):PRINT"----","----------------------------------------
1160 X$="$$#.##"
1170 PRINT:PRINT"PRICE",;:PRINTUSINGX$;D(X)
1180 PRINT"DATE PURCHASED",E(X)
1190 IFF(X)<>0THENPRINT"DATE DRUNK",F(X)ELSEGOTO1220
1200 PRINT"SCORE",G(X)
1210 PRINT"COMMENTS",H(X)
1220 PRINT"**********************************************************
1230 PRINT:PRINT"SCORE=COLOR(1) CLARITY(1) BODY(2) AROMA(5) TASTE(5)
      AFTERTASTE(2) GENERAL (4) TOTAL =20
1240 PRINT:PRINT"TO SEE ANOTHER WINE ENTER ITS NUMBER
1250 PRINT"TO SEE THE ORGINAL LIST ENTER 111: TO STOP ENTER 112";:INPUTX
1260 IFX=111THENRUN
1270 IFX=112GOTO990
1280 GOTO1150
5000 DATAHAUT CALON,1961,CHATEAU HAUT CALON MONTAGNE-ST EMILION 1961,BORDEAUX,4.
25,9.72,1.73,15,GOOD BOUQUET
12005 DATACHATEAU D'YQUEM,1967,CHATEAU D'YQUEM 1967,SAUTERNES,23.95,10.75,3.76,2
0,VELVET-SILKY
13030 DATAMUMM CORDON ROUGE,0,MUMM CORDON ROUGE BRUT,CHAMPAGNE,8.54,10.75,11.75,
18,FULL
18000 DATAEND
```



Sample Run

```
WHICH WINES DO YOU WISH TO SEE?

(1) ALL THE WINES
(2) JUST THE WINES THAT HAVE BEEN DRUNK
(3) JUST THE WINES THAT REMAIN
(4) RED WINES
(5) ROSE WINES
(6) WHITE WINES
(7) CHAMPAGNES AND SPARKLING WINES
(8) FORTIFIED WINES
? 7
```

	WINE	YEAR	TYPE
(83)	DRY MONOPOLE	0	CHAMPAGNE
(84)	KORBEL BRUT	0	CHAMPAGNE
(85)	KORBEL EXTRA DRY	0	CHAMPAGNE
(86)	MARMOT IMPERIAL	0	CHAMPAGNE
(87)	MARMOT IMPERIAL	1964	CHAMPAGNE
(88)	LES AMIS DUE VIN	1969	CHAMPAGNE
(89)	MUMM CORDON ROUGE	0	CHAMPAGNE

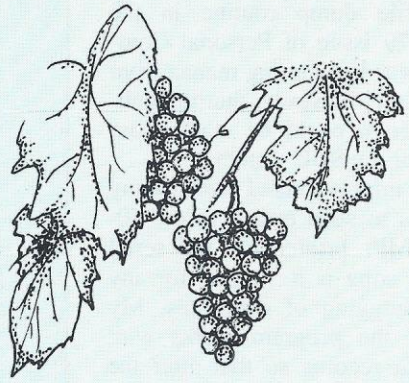
```
TO SEE INDIVIDUAL DATA ON ANY WINE ENTER ITS NUMBER.
TO SEE THE ORGINAL LIST ENTER 111: TO STOP ENTER 112
```

```
**********************************************************
WINE            MUMM CORDON ROUGE BRUT
----            ----------------------

PRICE           $8.54
DATE PURCHASED  10.75
DATE DRUNK      11.75
SCORE           18
COMMENTS        FULL
**********************************************************

SCORE=COLOR(1) CLARITY(1) BODY(2) AROMA(5) TASTE(5)
     AFTERTASTE(2) GENERAL (4) TOTAL =20

TO SEE ANOTHER WINE ENTER ITS NUMBER.
```



Dumpfile Revisited

BY RON BUSZTA

I was writing software to handle the prescriptions of a small pharmacy when I discovered a general-purpose, file dump routine in the March, 1979 issue of Personal Computing. It was like getting manna from heaven. I saw, however, that the published program could be made more powerful for my SOL system.

The first improvement I made for my system was to send output to my 40-character MPI printer via the serial port. Hard copy is a "must" for any serious debugging of data files. My version of the program works with fixed-length records so that after the filename is entered, a prompt is given for the record length. The filename is printed first, followed by the record length.

The next lines to appear indicate the number of records actually on file (next-available minus one) and the maximum allowed on file.

One rule I adhere to in writing application software is reserving record number one for certain "header" information when writing to data files. The first field written into this record is the Next Available Record Number. When the file is initialized, this field has a value of 1. The second field is the Maximum Number of Records allowed on the file, which upon initialization, is computed by multiplying the number of sectors allocated at file creation time by 256 (the sector length) and then dividing the answer by the record length. The second field is important since, before a record can be written to a file, I check to see that its record number is not greater than the maximum allowed on file.

The "records-on-file" number, a loop-controlling variable when records are written to the printer, indicates the upper limit of the loop.

The byte pointer P1 is always equal to the current record number, K, times the record length, L. Therefore, starting at byte 50 (the header record

Sample Run

```
FILENAME:  PRESCRIP    RECORD LENGTH:   50
RECORDS ON FILE:   5
MAX ALLOWED:       256


RECORD:  1

 790915                          1  5    Prescription Date
 100101                          6  10   Person No.
 1055302                         11  15  Prescription No./Dr. No.
 350                             16  20  Price
 20000                           21  25  Next/Prev Pointer
 790915                          26  30  Date Prescribed
VALISONE        RMB              31  50  Drug/Pharm. Initials
```

```
FILENAME:  FAMILY    RECORD LENGTH:   50


RECORDS ON FILE:   3
MAX ALLOWED:       6


RECORD:  1

 100100                                1  5
 74600000                              6  10
 1                                     11  15
 91                                    16  20
WAGER           43 RITA DR.            21  50

RECORD:  2

 100200                                51  55
 74609734                              56  60
 2                                     61  65
 91                                    66  70
VAKULA          12 LAKE DR.            71  100

RECORD:  3

 100300                                101  105
 74601234                              106  110
 3                                     111  115
 91                                    116  120
UNFRIED         SHERRI LANE            121  150
```

Program Listing

```
100 REM (* DUMPFILE ROUTINE FROM PERSONAL
110 REM (* COMPUTING  MARCH 1979
120 REM (* BY ILONA GROCHALSKA
130 REM
140 REM (* MODIFIED BY RON BUSZTA JULY 1979
150 REM
160 DIMA$(10),B$(3000)
170 INPUT"FILENAME ?",A$
180 INPUT "LRECL =",L
190 PRINT#1 "FILENAME:  ",A$,"   RECORD LENGTH: ",L
200 PRINT#1:PRINT#1
210 OPEN#1,A$
220 P1=0
230 READ#1 %P1,A,B
240 CLOSE#1
245 PRINT#1"RECORDS ON FILE: ",A-1
246 PRINT#1"MAX ALLOWED:     ",B
248 PRINT#1:PRINT#1
250 FOR K=1 TO A-1
260 P1=K*L
270 PRINT#1:PRINT#1"RECORD: ",K:PRINT#1
280 OPEN#1,A$
290 C=TYP(1)
300 IF C=2 THEN GOSUB 420
310 IF C=1 THEN GOSUB 360
320 IF P1<>(K+1)*L THEN 290
330 CLOSE#1
340 NEXT K
350 END
360 READ #1 %P1,B$
365 N1=N+1
370 N=N+LEN(B$)+2
380 P1=P1+LEN(B$)+2
390 N=N+INT(LEN(B$)/256)
400 PRINT #1 B$,TAB(32),N1,N
410 RETURN
420 READ#1 %P1,B
425 N1=N+1
430 N=N+5
440 P1=P1+5
450 PRINT #1  B,TAB(32),N1,N
460 RETURN
```

occupies bytes 0 to 49), the pointer to the beginning of each record will take on values of 50, 100 and 150 in the FAMILY file example. The record number, K, will be printed before each record.

Perhaps one of the most powerful features of North Star BASIC is the ability to test the next field to be read from file N by using the TYP(N) function. If the next field pointed to by the file pointer is numeric, the function returns a value of 2; if the next field is a string, the function returns a value of 1. One of two subroutines will be called depending on the value of the function. In addition, two pointers, N1 and N, represent the starting and ending byte of each field within the file. The first byte of the first data record (byte 50 in the file) is considered to be the first character of data. In my version of North Star BASIC, each number occupies 5 bytes while each string occupies its own length plus an additional 2 bytes (3 if it is longer than 256) when written to disk.

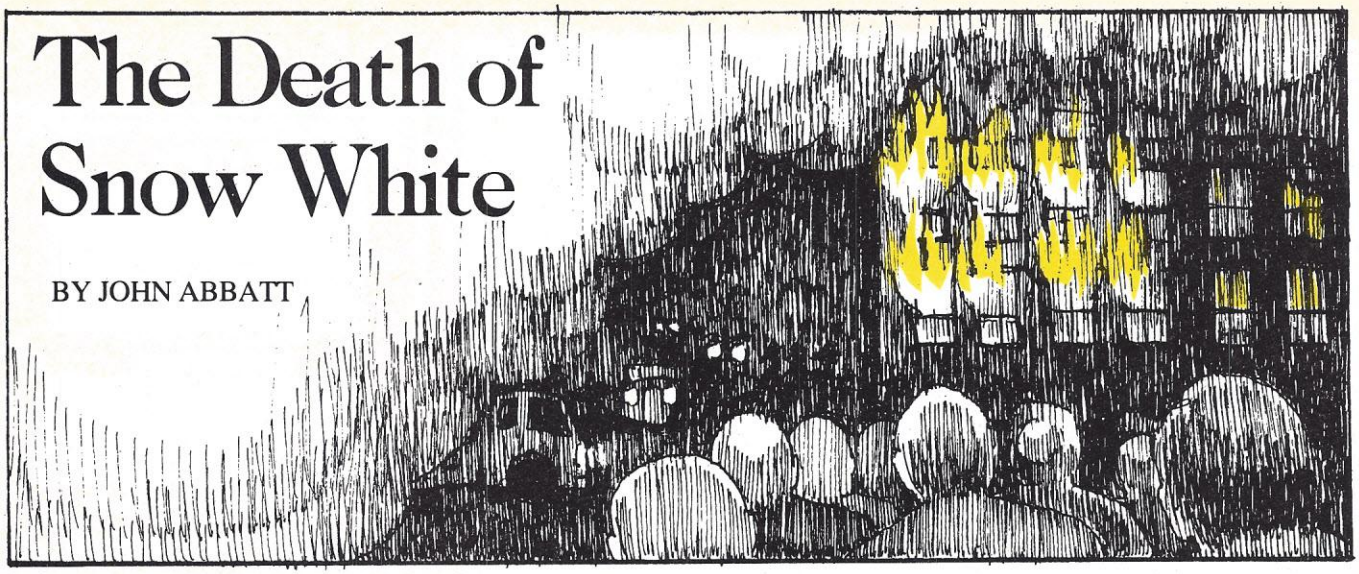
The byte pointer, P1, is updated after each access of a field by either 5 for a numeric or the length of the string plus 2. The end-of-record is known when the byte pointer, P1, is equal to the next record number, (K+1), times the record length. End-of-file is reached when K is equal to the next available record number.

The "body" of the DUMPFILE printout comes after the record number is listed. Each field will be printed on a separate line with the starting column and ending column it occupies, starting with character "1" for character position rather than "0" for byte position.

With these few additions to the original program, we have a file-oriented dump program that is quite powerful. □

The Death of Snow White

BY JOHN ABBATT



Bryn-Roberts just glimpsed the tiny figure tottering into their path in the smoky twilight.

"There's a kid in the road!" he shouted.

Warrener stood on the brakes just as the drive wheels hit a stream of foam flowing across the road and for five eternal seconds six tons of expensive fire tender was completely out of control. They slewed round. There was a slight bump as the onside wheels went over something, followed by a ghastly rending of metal as the jutting end of the ladder mangled itself against a brick wall.

They stopped.

The two men looked at one another and exhaled audibly. Warrener switched off the engine.

They got out and Bryn-Roberts automatically put on the pointed white helmet with the firecrest which marked him as a Site Controller. A glance showed that the tender was unmarked, but the ladder was a costly write-off. There would be an enquiry for a certainty.

He looked around for the child and suddenly spotted the little form crushed under a back wheel. The whole of the lower trunk and legs were almost flattended by the weight, but the head and upper trunk were clear. It wore a tall, pointed cap with a bell on the end. The neck swivelled and the beady eyes took in the helmet.

"Hello, Big Ears," said a plaintive voice. "Can you find my little car for me? I love you, Big Ears. Poop! Poop! Love you, Big . . ."

It gave a little sigh and the head fell back. Noddy had expired.

"I'm afraid he's gone, sir," said Warrener reverently in his right ear.

"It's only a toy, you fool," began Bryn-Roberts. Then he recognized the deadpan expression of the other's face which always made him suspect that a well-concealed cynicism lay behind his more inane remarks. On the other hand, the realism of the modern doll often affected people in strange ways. They had been developed to the point where they could discern simple shapes, talk and respond to a range of commands. The microprocessors in the chest cavity also controlled the limb motors and would recharge the battery from the mains when necessary. The rubberoid musculature and plastiskin completed the lifelike effect, which had been the goal of the soft toy industry ever since the first doll had said 'Mama'.

He had seen some of the Press stories; about their 'adoption' by childless couples; the massive decline in dog and cat sales; the dolls' cemeteries and funerals; doll-sitters!

They had all of the affection of pets and young children at only a fraction of the expense and with none of the problems of mess, obedience or growth.

A touch on the shoulder made him straighten up. It was Flanagan, his second-in-command.

"She's well ablaze, sir," he reported.

The toy shop was just across the road and dancing white flames shone through the shattered plate glass windows. Great gouts of smoke and soot gushed through the broken panes to lick at the untouched upper stories.

"We're having problems with the crowd, sir," Flanagan continued.

He noticed for the first time that men who should have been fighting the fire were engaged in trying to hold back a bunch of people who were yelling and trying to reach the building.

"Good God! I've never seen a crowd behave like that before. Generally they are quiet. What the hell's the matter with them?"

"It's the top floor, sir," Flanagan gestured upwards. "They are much exercised about the fate of the Cuddly Toys Department."

Now he could see that on the fourth floor there were rows of faces peering over the sills. Tiny hands waved at them and pathetic little voices floated in the air.

Bryn-Roberts set his jaw. "I don't care how lifelike they are. No man in my command is going to risk his life to save a doll."

"We've accounted for all the staff except a Miss Sinclair, sir. She runs the Cuddly Toys Department. We think she's still up top."

There was a sudden roar and a shower of sparks as part of the ground floor ceiling collapsed.

"The ladder would have been handy, sir," said Warrener deadpan.

Bryn-Roberts had the urge to strangle him but instead climbed wearily back into the cab and reached for the microphone. It had the makings of a long night.

Jenny Sinclair had been counting the day's takings on the deserted top floor when the alarm bell had rung. She hesitated: there had been false alarms before. Then she thrust the cash and vouchers back in the till, locked it, and walked unhurriedly to the fire staircase.

The door handle was warm to the touch and, as she pulled it back, a billow of smoke and scalding air blew past her. She

This story originally appeared in the May 18, 1979, issue of Datalink, *a British computer magazine.*

Illustrations by Jacky Brill

remembered that a lot of surplus packing material had been temporarily piled on the landings. Many would have panicked at that point but she was both intelligent and cool-headed. Her faculty of remembering all of the command phrases for the various toys had secured her the lucrative post in this Department.

She dragged a cloth off of a stand, sending dolls crashing to the floor, and sealed the bottom of the door. Then she ran across to the main door, only to reveal more smoke and heat. She could see flames below when she looked briefly down the stairwell. So she returned and sealed that door as well. The temperature was rising noticeably now and it was affecting the working of many of the toys. They were rustling and chattering on the shelves and in boxes, like a flock of bats disturbed in hibernation.

She tried the phone: nothing.

As she crossed to the window she heard a tearing sound to one side. A crowd of Smurfs was running along a shelf and had cannoned into the top of an elaborate ornamental archway. This must have been finely balanced because the entire structure had come adrift and was toppling towards her.

She threw herself full length in the meagre shelter of a low platform and the wreckage cascaded about her. When it stopped she discovered that she was lying on her back, unhurt, and could move her arms and legs, but a large beam was snug above her waist and there was nothing that she could do either to shift it or to wriggle free.

"Of course I'll authorize an eight mile trip," said Bryn-Roberts. "I've got to have another escape ladder here urgently."

Some self-preservation circuitry seemed to have been activated in the toys by the heat. They sensed the coolness of the outside air and jostled to get to the windows. A large Womble used its superior height and strength to open the bottom of the frames a few inches and the toys pushed their faces through the gaps and shouted and gestured at the people in the street below. Tiny feet tried ineffectually to obtain a purchase on the skirting board. The toys at the back tugged at those in the front. Snoopy tore the trousers off of Pinocchio.

She realized that the open windows were creating a through draft. "Uncle Bulgaria," she cried. "Close the windows! Close the windows!"

The long snout came round and the head moved from side to side as he scanned for the source of the voice. Then he turned away. She drew breath to shout again but then gave up. The microprocessors had to link a voice with an upright human shape before they would act. This was how they managed to ignore background noise.

Mickey Mouse scurried past her carrying a fire extinguisher. "Good boy, Mickey. Bring that to me!" she called.

He ignored her and crossed to a window, where he lifted the cylinder up and proceeded to use it as a club.

"Let Mickey through fellows please," he said calmly as he smashed off limbs and split open heads. Then abruptly he went down himself, rabbit punched from behind by Grumpy. He rolled about senseless beneath the stamping feet and was soon reduced to a shapeless mass of components.

Two Paddington bears came wandering aimlessly out of the stock room pulling on their slouch hats. They looked as though their combined strength might be enough to shift the beam that pinned her waist.

"Over here, Paddington!"

They paused and scanned for the source of the voice, then came across.

"I want you both to listen very carefully . . . "

She broke off for, without waiting for instructions, they had moved forward purposefully. She could feel the furry paws moving on her exposed legs. Nylon claws were catching in her tights, laddering them.

"No, Paddington. I want you to get hold of this big piece of . . . No! No!"

They ignored her shouts and entreaties and she remembered with horror that these were the two experimental models that were being programmed to teach children the first steps in sex education.

For ten minutes, as smoke crept through the crevices in the doors, and the clamour from the street below grew, she writhed helplessly as the two bears poked and patted her as though she were some clinical specimen. They seemed to be possessed of a limitless manic prurience and were 'educating' one another in their growling voices by reciting the anatomical inventory of their discoveries. They appeared to have gone into a loop. Duffle coat buttons were rasping against her bare flesh. A flicker of flame suddenly curled up in one corner of the room but her tormentors were not distracted.

A window burst in and a man in a tall white helmet with a red crest broke into the room, swinging an axe.

"Over here," she called, coughing in the acrid smoke.

Fifty pairs of scanners took in the newcomer.

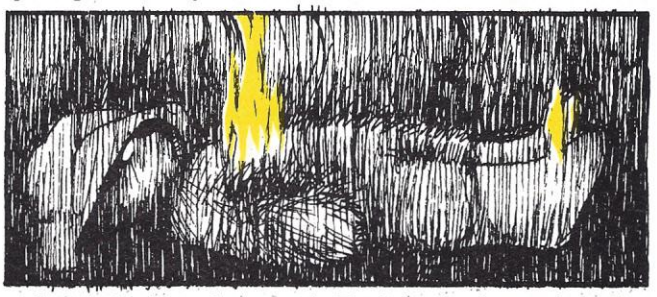
"It's a wizard!" called out Snow White.

"Death to the wizard!" yelled Humpty Dumpty and the others took up the cry.

Suddenly Bryn-Roberts was fighting for his life. Snow White was jabbing at him viciously with the end of a broom and he decapitated her with one swing of the axe, but she still bore in blindly until he hacked at her bodice. Then she collapsed, but she served to distract him long enough for Donald Duck to butt him painfully in the back of the calf. He went down on one knee. The soft hands were clutching and clawing from all sides as a belt of flame ran across the ceiling. The axe was twisted from his grasp.

"The helmet! Take off the helmet!" shouted Jenny.

He took it off with both hands and rammed it over the spitting head of Sylvester.



Suddenly they all stopped. To their simple receptors the removal of the helmet had transformed him from a hated wizard to an inviolable human. He rose and staggered across the room, kicked the two industrious Paddingtons away, and released her from the beam. The place was fast becoming a holocaust. It was painful to breath.

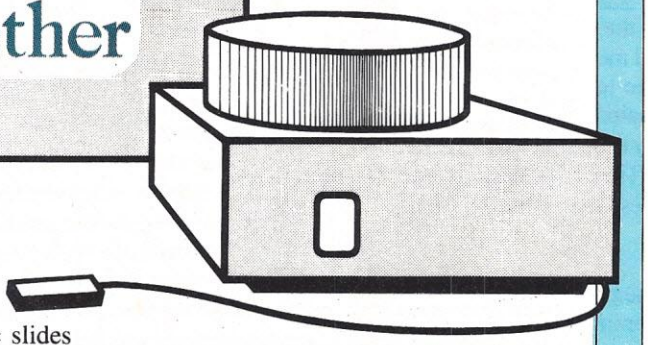
"I'll go down the ladder first," he gasped. "Guide your feet. Do you want to save any of this lot?"

She glanced down at the ruins of her clothing. "They can all fry as far as I'm concerned."

As he guided her down the swaying seventy foot ladder, he thought he could pick out Warrener's voice from the clamour beneath. "Well done, Big Ears!" he shouted.

Every now and then a soft body would squeeze through the gap above their heads, grapple wildly with the rungs, and then hurtle past to the hard ground; and each time it happened a wail of anguish went up from the swelling crowd. □

Getting Your Act Together



BY CECIL SMITH

Arranging photographic slides for a presentation can be time consuming and frustrating. By using your microcomputer to arrange the slides on paper and then loading the slide tray from the result, you can save time and maintain a permanent slide log.

The four basic activities in loading a slide tray for a presentation are:

- Initial loading of the slides (New)
- Exchanging slides (Change)
- Adding new slides (Add)
- Removing existing slides (Dele)

This program offers the operating mode options (New, Change, Add or Dele) in a menu for selection.

In the New mode, enter slide descriptions sequentially until you have no more slides to describe or there are no slots left in the slide tray (whichever occurs first). A "222" response to the Description prompt exits the New mode.

If you exchange a slide, change only the slide description in that slot number; all other slots remain unaltered. The Change mode prompt requests SLIDE NO., DESCRIPTION . A response of "222," exits the Change mode.

Adding a new slide to an existing program presents the most formidable problem. Room must be made for the new slide description by moving existing slide descriptions in higher number slots up one slot. After the slide descriptions have been rearranged to make room for the new slide, the new slide description is "dropped" into the empty slot. Since additions alter all of the slide descriptions in higher slot numbers, add the highest slot slide description first. To exit the Add mode, enter "222" to the Add prompt.

Removing a slide creates an empty slot that must be filled with the slide description in the next higher slot number. This filling of the empty slot "daisy chains" through the occupied slots. A response of "222" exits the Dele mode. Like the Add mode, deal with the highest numbered slot first.

After exiting any of the four operating modes, a prompt asks if more changes are forthcoming. A "Y" results in a return to the menu to allow changing of operating modes. If you enter "N," a prompt asks which slots are to print slide descriptions. A "222" response to the slide number request prints all occupied slots in order.

The log is printed with an identifying Presentation Title and Tray Number for presentations with more than one slide tray.

After printing the presentation log, a "More" prompt allows further changes to be made. A "Y" presents the menu, and an "N" ends the program.

The program accommodates an 80-slot slide tray. Trays with other capacities can be accommodated by changing dimensions and counting statements. I recommend a minimum of 4K memory for an 80-slide presentation. With sufficient memory, multiple trays can be programmed simultaneously by changing the matrix and counting statements to process one column per slide tray.

In this program, a warning appears when you enter more than 80 slide descriptions. The program will automatically enter the Dele mode so you may delete slides to free more room in the tray.

Using a program to assemble a slide presentation not only saves time, but the hard copy log saves embarassment when you dump the tray on the floor five minutes before a presentation. □

Program Listing

```
 1Ø PRINT "SLIDE ARR
ANGEMENT PROGRAM"
 2Ø PRINT " "
 3Ø PRINT "TITLE OF
PRESENTATION"
 4Ø INPUT A$
 5Ø PRINT "TRAY NUMB
ER"
 6Ø INPUT B
 7Ø DIM X$(82)
 8Ø FOR N=1 TO 82
 9Ø X$(N)="XXXX"
 1ØØ NEXT N
 11Ø PRINT "NEW, CHA
NGE, ADD, OR DELE"
 12Ø INPUT D$
 13Ø IF D$="NEW" GOT
O 39Ø
 14Ø IF D$="CHANGE"
GOTO 34Ø
 15Ø IF D$="DELE" GO
TO 25Ø
 16Ø PRINT "ADD THE
HIGHEST SLIDE FIRST"
 17Ø PRINT "SLIDE NO
., DESCRIPTION"
 18Ø INPUT E, C$
 185 IF E=222 GOTO 4
5Ø
 19Ø FOR F=81 TO E S
TEP -1
 2ØØ G=F+1
 21Ø X$(G)=X$(F)
 22Ø NEXT F
 23Ø X$(E)=C$
 235 IF X$(81)≠"XXXX"
GOTO 64Ø
 24Ø GOTO 17Ø
 25Ø PRINT "DELE HIG
HEST SLIDE FIRST"
 26Ø PRINT "DELE SLI
DE NO."
 27Ø INPUT H
 28Ø IF H=222 GOTO 45Ø
 29Ø FOR I=H+1 TO 81
 3ØØ J=I-1
 31Ø X$(J)=X$(I)
 315 IF X$(I)="XXXX"
 GOTO 26Ø
 32Ø NEXT I
 33Ø GOTO 25Ø
 34Ø PRINT "SLIDE NO
, NEW DESCRIPTION"
 35Ø INPUT K, L$
 36Ø IF K=222 GOTO 4
5Ø
```

```
 37Ø X$(K)=L$
 38Ø GOTO 34Ø
 39Ø PRINT "ENTER SL
IDES FOR NEW TRAY IN
 ORDER"
 4ØØ FOR M=1 TO 8Ø
 41Ø PRINT "SLIDE NU
MBER";M
 42Ø INPUT X$(M)
 43Ø IF X$(M)="222"
GOTO 445
 44Ø NEXT M
 445 X$(M)="XXXX"
 45Ø PRINT "MORE?":I
NPUT O$
 47Ø IF O$="Y" GOTO
11Ø
 471 S=Ø:T=Ø
 472 PRINT "PRINT SL
IDE NO.":INPUT S
 473 IF S=222 GOTO 4
8Ø
 474 PRINT "TO SLIDE
 NO.":INPUT T
 48Ø PRINT " "
 49Ø PRINT " "
 5ØØ PRINT " "
 51Ø PRINT "SLIDE LO
G FOR ";A$
 52Ø PRINT " "
 53Ø PRINT "TRAY NO.
 ";B
 54Ø PRINT " "
 55Ø PRINT "********
**********"
 554 IF S=222 GOTO 5
6Ø
 555 FOR P=S TO T
 556 GOTO 565
 56Ø FOR P=1 TO 82
 565 PRINT "********
**********"
 57Ø IF X$(P)="XXXX"
 GOTO 6ØØ
 58Ø PRINT "NUMBER";
P
 585 PRINT X$(P)
 59Ø NEXT P
 6ØØ PRINT "********
**********"
 6Ø2 PRINT " "
 6Ø3 PRINT " "
 6Ø4 PRINT " "
 61Ø PRINT "MORE?" :I
NPUT Q$
 63Ø IF Q$="Y" GOTO
11Ø
 637 END
 64Ø PRINT "THERE AR
E NOW 81 SLIDES"
 645 GOTO 25Ø
```

Sample Run

```
RUN
SLIDE ARRANGEMENT PR
OGRAM

TITLE OF PRESENTATIO
N
? OPERATIONAL TV 1
TRAY NUMBER
?1
NEW, CHANGE, ADD, OR
 DELE
?NEW
ENTER SLIDES FOR NEW
TRAY IN ORDER
SLIDE NUMBER 1
? OPERATIONAL TV 1 T
ITLE
SLIDE NUMBER 2
? E N G
SLIDE NUMBER 3
? ENG CAMERA
SLIDE NUMBER 4
? E F P
SLIDE NUMBER 5
? EFP CAMERA
SLIDE NUMBER 6
? STUDIO
SLIDE NUMBER 7
? STUDIO CAMERA
SLIDE NUMBER 8
? 222
MORE?
? N
PRINT SLIDE NO.
? 222
SLIDE LOG FOR OPERAT
IONAL TV 1

TRAY NO.  1

**********
**********
NUMBER 1
OPERATIONAL TV 1 TIT
LE
**********
NUMBER 2
E N G
**********
NUMBER 3
ENG CAMERA
**********
NUMBER 4
E F P
**********
NUMBER 5
EFP CAMERA
**********
NUMBER 6
STUDIO
**********
NUMBER 7
STUDIO CAMERA
**********
**********

MORE?
?Y
NEW, CHANGE, ADD, OR
DELE
? ADD
ADD THE HIGHEST SLID
E FIRST
SLIDE NO., DESCRIPTIO
N
? 2, PRODUCTION/POST-
PRODUCTION, DISPLAY&
DISTRIBUTION
?EXTRA IGNORED
SLIDE NO., DESCRIPTIO
N
? 222,
MORE?
?Y
NEW, CHANGE, ADD, OR
 DELE
?DELE
DELE HIGHEST SLIDE F
IRST
DELE SLIDE NO.
?222
MORE?
?N
PRINT SLIDE NO.
?1
TO SLIDE NO.
?4
SLIDE LOG FOR OPERAT
IONAL TV 1

TRAY NO.  1

**********
**********
NUMBER 1
OPERATIONAL TV 1 TIT
LE
**********
NUMBER 2
PRODUCTION/POST-PROD
UCTION
**********
NUMBER 3
E N G
**********
NUMBER 4
ENG CAMERA
**********

MORE?
?N
```

Triumphs and Tribulations

BY KEN MAZUR

It's hard to explain fully the feeling you get working with a Disk Operating System if all you've ever been exposed to is a Basic machine. It's a whole new world. Basic, which used to be the total power of the micro, now becomes just one more program in a wide range of possibilities.

A Disk Operating System (DOS) offers some powerful utilities outside of Basic and even Basic takes on new dimensions with the Disk Basic commands added.

If you think you're really learning the power of a microcomputer as you become increasingly skilled in Basic applications programming, be warned: there's a lot more to learn when you convert to disks. New manuals to pour over, new books that suddenly become important and meaningful, and new programs available on disk that just won't work with a cassette recorder based machine are just some of the adventures that await the disk system owner.

When I first got my Level II TRS-80 and worked solely in Basic, I was impressed with the wide variety of things it could do. Now, it can do more, faster and better. It's almost worth the price of the disk drive not to have to wait for the asterisk to stop blinking during a CLOAD. What used to take minutes (sometimes it seemed like hours) to load into the machine now takes seconds. Backing up a program is a breeze instead of a time-consuming chore. Cassette recorder volume settings no longer play a major part in your computer experience.

DOS can be a mind-bending experience if you've never used one. Want to work in Basic? You got it. Want to back up an entire disk? You got it. Want to chain programs together? You got it. Want to renumber program lines without having to first load a special tape? You got it. Zip. Zip. Zip. It's all there and more just about as fast as you can type in the commands calling up the appropriate files. You can spend more time working with the machine than waiting for it.

Once you've worked with the random access capabilities of Disk Basic (or even the increased loading speed of Disk sequential access), you'll wonder how you ever survived with a cassette.

Converting from a cassette recorder to a disk system isn't without its own frustrations, however, as many a disk owner will be glad to relate.

The day my two 40-track MPI mini-disk drives and 32K expansion interface (EI) arrived from Tora Systems of Astoria, New York, was tremendously exciting.

Somehow, despite being wrapped in a padded plastic sheet, one of the drive gates had popped open during transit and the inside of the drive was stuffed with those small, white foam "snakes" used to protect shipments of goods.

The first hour was spent on the floor gently removing the foam intruders. Co-workers alternated between helping me dislodge the stuffers my stubby fingers couldn't reach and popping the air bubbles of the plastic wrapping. After we removed all the "worms" we could see, I repacked the drives and took them and the expansion interface (EI) to my 16K Level II TRS-80.

Being less then mechanically inclined (I'm pleased if I screw in a light bulb and it works the first time), I was apprehensive when I prepared to connect the new equipment to my system. I decided to attach the equipment in steps with testing at each step.

The first step was to remove the power supply compartment cover of the expansion interface to put in the power supplies. Having met that challenge, I placed the EI beneath the video display and connected the EI and keyboard with the cable provided by Tora.

The first moment of truth. I powered up the system. In fact, I powered up three times and three times I got gibberish on the video. Hmmmm. I whipped out my TRSDOS Reference Manual. (I had already worked with TRSDOS and NEWDOS while doing graduate work in computer science at Wesleyan University.) There didn't seem to be any indication as to why the system should be acting that way so I reread the power-up instructions in the EI manual. Sure enough, in a note on Page 8 there was an instruction to hold down the "Break" key if a system had the EI without a mini-disk system attached.

I started the sequence all over again, held the "Break" key and was rewarded with the MEMORY SIZE? prompt. I could hardly contain my excitement. The first thing I did was key

in PRINT MEM (TRS-80 request for free memory). The display showed 48340. I found it hard to believe — all that room!

I shut the system down and unpacked the disk drives. As they were already cabled together, I carefully placed them on my systems desk and plugged the cable into the rear of the EI. The remainder of the plugs (the power to each of the drives) went into one of those heavy-duty multiple outlet strips. I shut off the CPU, turned everything else on (the drives, EI and video) and flipped the switch for the power outlet.

Placing a TRSDOS system disk into Drive 0, I turned on the CPU. The drive whirred and I felt like cheering when the video pronounced DOS READY.

The first rule for any computerist is: Make a backup. I slid a blank diskette into Drive 1 and typed BACKUP. The system worked perfectly and I then had two system disks available.

For the next couple of hours I did little more than refamiliarize myself with the DOS. Occasionally I would get messages like "VERIFYING TRACK 37, SECTOR 06; CRC ERROR! TRACK LOCKED OUT!" and "LOAD FILE FORMAT ERROR" but with a TRS-80 that's known to happen and I wasn't particularly worried about it as I had a copy of Harvard Pennington's book *TRS-80 Disk & Other Mysteries* which takes you step by step through the process of correcting problems with a disk system.

The more I played with the system, however, the more little problems started creeping in. At first it was a random rebooting of the system. I'd have a Basic program in the machine when the drives would kick on by themselves and reboot the DOS. Like most TRS-80 owners I had heard bad things about the Radio Shack DOS so I put in NEWDOS (Apparat's marvelous system).

To make a long, frustrating story shorter, my system began to degenerate. At first, I could manipulate the disk files in any way I wanted. Later, I could load a file into my CPU but I couldn't transfer a file from one drive to another. After a while, regardless of which operating system I had in the machine, the drives would kick in and stop by themselves. If I tried to reboot the system after that event, my video would announce that there was no system on the diskette. I decided that things were getting worse rapidly and determined that I should probably look at the disk using the NEWDOS "Superzap" program. I might have had the right idea but it was evidently too late. I could get a listing of a disk directory but I couldn't take any of the files that I saw and load them into the CPU.

After several more attempts to manipulate files (still with the random rebooting of my drives), I realized I was down to three diskettes: a NEWDOS system disk, a TRSDOS system disk and a data diskette I had prepared at Wesleyan containing programs I had written while at the university. No backups left. I couldn't afford to lose the originals too, so I decided to seek help.

The next day, Bob Costello of Tora and I discussed what the problem might be. One possibility was a bad chip with several courses of action available. I could send the equipment back to Bob which he would gladly test for me or I could start pulling rows of chips to see if one of them was causing problems. One course of action would tie up my use of the equipment while it went from Boston to New York and back again; the other would have me, Mr. Unmechanical, poking around inside the Expansion Interface.

Needing my machine daily in my work, I decided on a third course: take the equipment to a local computer facility and have it looked at.

That Saturday I packed my CPU, EI and disk drives and brought them to Computer City in Charlestown, MA. Dave Lourie, owner of Computer City, Paul Armstrong, the repair manager, and Joshua Estrada, a repair technician, all agreed to let me watch the process of repairing my machinery.

Paul and Josh started plugging things in and clipping wires to the equipment; it looked like the intensive care unit of a hospital by the time they were through. I must have asked four thousand questions as the technicians mulled over the various patterns that wobbled over the screen of the oscilloscope.

In short order, the two technicians found the problem. Two of the wires leading from the power supply of one of the drives to its transformer had come loose from the solder joints. The drive had been getting intermittent power which caused it to behave erratically. They corrected the problem and aligned the drives for good measure. Four hours later, I was repacked and on my way. The MPIs have performed excellently since then.

Those are some of the frustrations of working with disks. Those frustrations are more than offset by the pleasure of having a disk system.

My system even has me playing games although not the ususal games one refers to when talking about microcomputers.

Once you've worked with a disk, you'll wonder how you ever survived with a cassette recorder

My video is covered with the National Tricor green plexiglass accessory that makes a TRS-80 video display look like a large terminal. Sometimes I'll turn down the brightness of the video until the screen looks black. I then jack up the contrast slightly so that any printing appears to float on a sea of blackness. Without the accessory, reading from the screen looks like you're reading white letters off grayish paper. With the accessory, it looks as though the letters are hanging in space. (For a review of this product, see Product Close-Up in the May issue.)

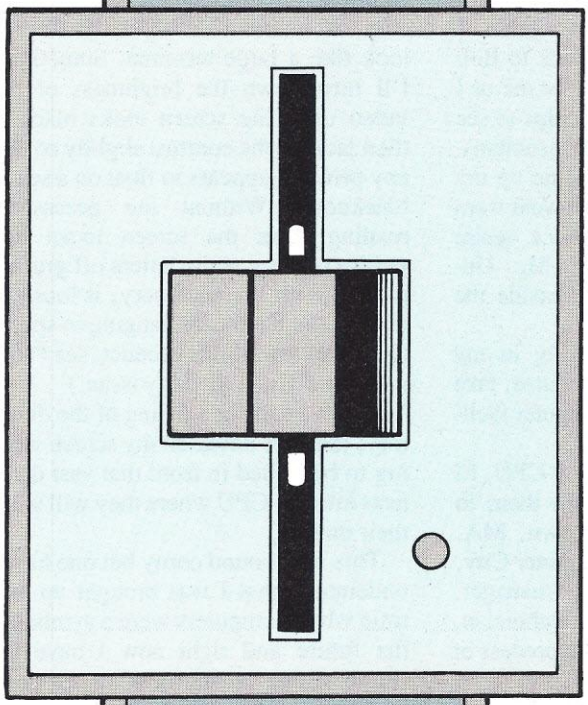
When I call for a listing of the directory, the files hover on my screen waiting to be pulled in from that vast darkness into the CPU where they will work their magic.

This may sound corny but one has to understand that I was brought up in a time when computers were a symbol of the future and right now I have the future sitting on my desk. It's a good feeling to manipulate that small but powerful microcomputer and I still feel a rush of amazement when I boot my system and see the DOS READY prompt appear on the screen. I hope that feeling never goes away. One disk is better than none at all and two is even better. If you have more than two you're luckier still.

With a disk, your machine will never be the same. Neither will you.

Start saving your money for a disk now. You'll be glad you did. □

Behind the Whirrs and Clacks



A Look at Disk Fundamentals

BY KEN MAZUR

One of the most powerful features of any microcomputer is its memory. It's in a machine's memory that we can put the instructions for performing specific operations (a program) and/or we can place and manipulate data to accomplish certain ends.

The two types of memory most often associated with microcomputers is RAM (Random Access Memory) and ROM (Read Only Memory); these are generally considered internal memory.

There is another form of memory for these powerful little machines, however, which goes under a variety of names such as "external," "auxiliary," "mass," "bulk," "storage," "off-line," or "secondary storage" memory. While internal memory (RAM or ROM) gives your microcomputer power, the external memory capability gives it versatility. Without some form of external storage, our micros would be little more than expensive paperweights after our first few sessions with them.

At present, two means of external storage are developing rapidly in the micro field: magnetic tape and magnetic disks. Other forms exist but are currently either too expensive or too limited in application.

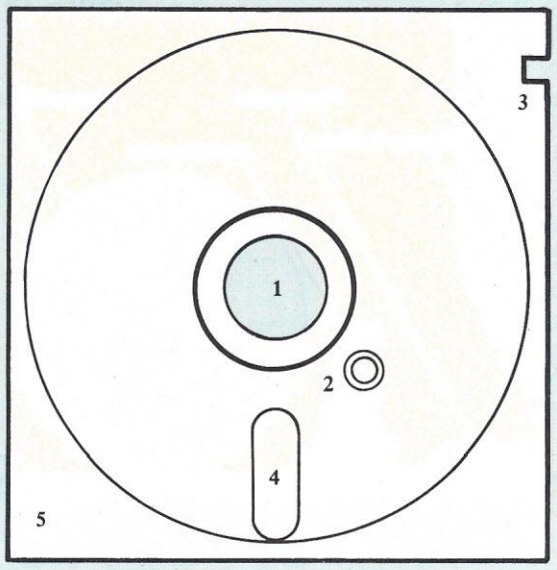
To better understand the major role external storage devices such as cassette tapes and disks play in a micro system, let's review the functions each type of memory performs.

ROM is a bunch of minute electronic switches that are "burned' into permanent configurations on a special silicon chip by the manufacturer. Because those configurations are permanent and will not be lost when the power to your micro is turned off, ROM is used for such things as storage of high level language interpreters, storage of "bootstrap" programs, which readies your machine when you first turn it on, and a number of other functions. As the name implies — Read Only Memory — you can only look at how the ROM is configured; you cannot change it. For most micro owners, the ROM is designed to perform specific functions and while you can look at it if you know how, you can't do much about it.

RAM, on the other hand, is more flexible to the average user as you can put data into it or take data out. It's the area you use to create programs or store instructions for the computer to follow. Though this ability to change RAM is an asset, it is also a problem in that whenever the power supply is cut, whatever was in the RAM is lost.

So, the situation we have with ROM and RAM is as follows: ROM holds permanently the circuitry that enables

Figure 1.



1) Drive hub hole. 2) Sector index hole. 3) Write protect notch. 4) Head access hole. 5) Diskette jacket

your micro to understand your instructions while RAM provides an area in which you can build or put those instructions.

With just these two types of memory available, however, the micro is severely limited. Access to internal memory may be extremely fast (which allows the micro to do many things quickly) but that memory is limited in terms of amount. Most micros utilize between 4K and 64K of memory and that's all the room you have to do whatever it is that you have your micro do. You can fit one large program in that memory space and have the machine perform it over and over again without ever turning the machine off or you can jam a bunch of little programs in memory (this gets complicated in terms of the programming and operation of the system), again without turning off the machine.

Any time you want to change the function the machine performs or any time the power is cut, you're in trouble if all you have available is ROM and RAM. To get a new set of instructions into memory, or to replace the instructions lost through a power failure, you would have to punch in the instructions from the keyboard all over again. There would be no justification for a micro if you had to do that each and every time you wanted to use the data manipulation power the ROM and RAM provide.

Hence, the importance of external memory devices which allow you to store and access a variety of programs for a variety of applications with a minimum of effort.

As stated earlier, external memory devices at the present time take two major forms: magnetic tape and magnetic disks. Each medium has its own strong and weak points.

For instance, tape is relatively cheap (cassettes are inexpensive; you can get a functioning cassette recorder for less than $50) but is also relatively slow and sequential in nature. That is, if you have a program you wish to use on the last one-quarter of a given tape, you somehow have to bypass the first three-quarters of that tape until you reach the program you desire. Magnetic tape may also be finicky in terms of reliability. (Such things as reliability, data transfer rate and access time are greatly improved in some of the newer non-cassette recorder tape media. For an in-depth review of an alternative, read the Exatron Stringy Floppy review in this issue.)

Disks, on the other hand, offer high data transfer rates, large storage capacities, reliability and semi-random access (you can go directly to the program you want on the disk without having to look at everything "saved" ahead of the item you want). They are, however, expensive.

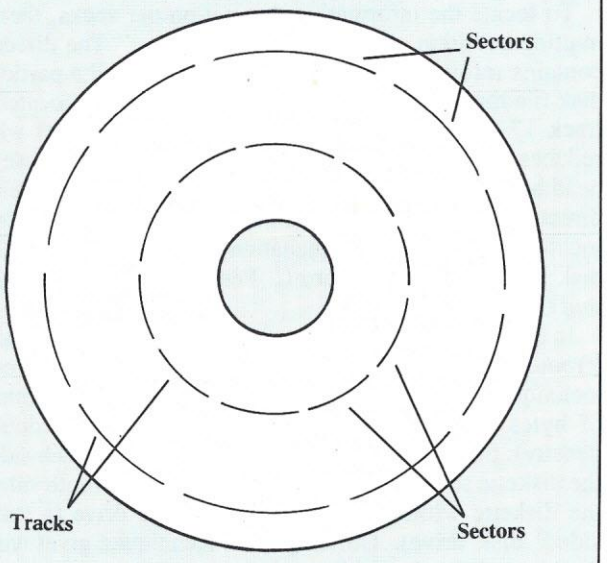
Home computerists are turning more and more to disk systems every day. For business applications, a disk system is a necessity, not a luxury. (There are extremely fast digital tape systems which hold "tons" of data, but many of these are either expensive, large or not plug-in compatible to the micros around.)

There are four aspects to disk systems available for a micro: the diskettes (the little round/square things that programs and data are actually stored on); the disk drive (the machine that enables you to put data on the diskettes and take them off); the controller (the physical electronics that interface the computer to the disk drive); and the Disk Operating System (the software that allows you to store or recall data without having to know how it's done or where the data goes to or comes from on the diskette).

A floppy diskette is a flat, circular piece of flexible plastic coated with a metallic oxide. The plastic is sealed inside a square jacket that is either 5-1/4 inches to a side or 8 inches to a side. The plastic disk is never supposed to be removed from the jacket. Hard disks (more like smooth records without grooves) come in 8″ and 14″ sizes.

For the disk drive and computer to access data on the surface of the floppy diskette, there are a number of notches, holes or openings in the jacket (See Figure 1). The large hole in the center is for insertion of the disk drive hub (which spins the plastic inside its jacket). The small hole located near the larger, center hole is the sector index which is used by the drive to sense each revolution of the diskette. There is only one hole when the disk utilizes the "soft-sectored" technique. For a disk using the "hard sectored" technique, there are many small holes and each indicates the beginning of a sector. (We'll get to sectors shortly.) Soft sectored disks and hard sectored disks are not compatible; if your system uses one, it cannot use the other.

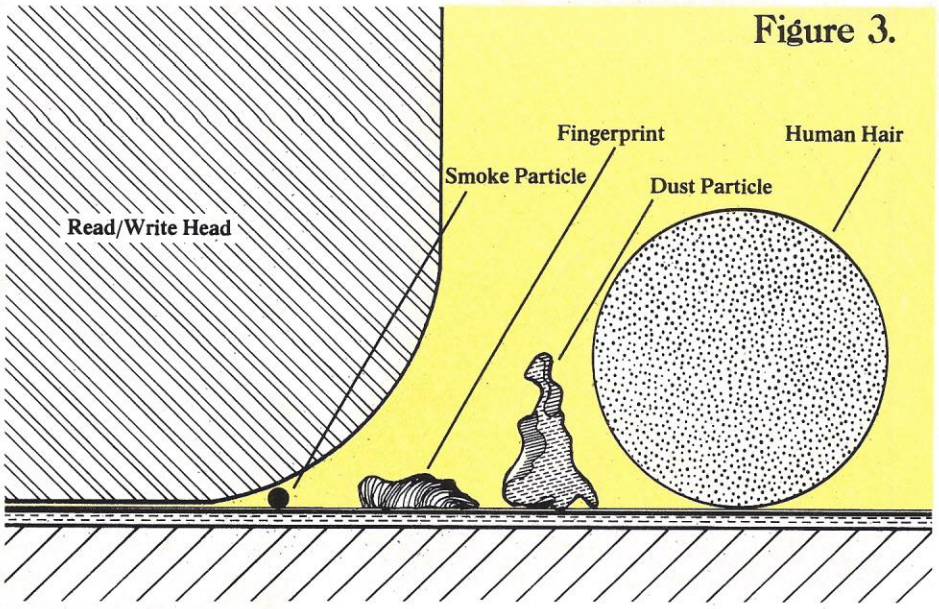
Figure 2.



The squarish notch in the edge of the jacket is the "write protect" notch. If the notch is unobstructed, you can read data (programs, files, etc.) off the disk *and* change data or put data on the disk. If you cover that notch with the little, sticky tabs provided when you buy a blank disk, you can only read from the disk, you *cannot* put information on the disk or change its contents. (Always keep that tab over the notch on any disk which contains data you don't want to accidently destroy.)

The elongated oval opening in the jacket is called the "head access hole" or "read/write notch." It is the opening that allows the drive's read/write head to take information from or put data on the diskette.

Information is stored on a diskette in the form of "0s" and "1s" represented by particles magnetized in one direction or the other. The read/write head of the disk drive performs that function. But for your system to access the stored information, another process must take place first.



This diagram dramatically illustrates the incredibly small tolerances of the head flying heights in a hard disk cartridge drive compared to the relative sizes of common contaminating particles. Even something as apparently flat as a human fingerprint is huge compared to the space between the flying read/write head (the head floats on a cushion of air) and the surface of the hard disk. While most particls do not cover up or mask bits of data, they do cause spacing loss resulting in a signal loss or reduction. A more serious consequence is that a large enough particle will cause the head to plane above it with a resulting crash on the far side of the particle — not a particularly fortuitous event as the crash may cause phyical damage to the disk. A floppy disk jacket is lined with special cleaning fiber but it too can suffer from particles on the surface of the diskette. (Diagram by 3M Company)

When you get a blank diskette (or bulk erase an old one) there is no information on it. To make the diskette useful, your micro system "formats" the diskette to specifications your machine recognizes. In short, your Disk Operating System (DOS) has a utility that formats a diskette with tracks and subdivisions of those tracks called sectors. (See Figure 2.) The number of tracks generally ranges from 35 to 77 tracks on one side of a diskette. The number of sectors per track and the number of bytes of information per sector varies from manufacturer to manufacturer. Your data reside within those bytes, in the sectors, on the tracks.

To locate the information you put on the tracks, the formatting program also creates a "directory." The directory contains information your system needs to find a particular disk file rapidly. On the TRS-80, the directory is located on track 17 (the half-way track of a 35 track system) which reduces the travel time of the read/write head because the head has to travel only half the radius of the diskette in either direction to access the track on which the file you requested is located. (For the best explanation and tutoring on TRS-80 disk systems, read Harvard C. Pennington's book, *TRS-80 and Other Mysteries.)*

In addition to increasing the number of tracks on a diskette (from 35 to 40 or 77) to store information, there are two other techniques that increase storage: one is doubling the number of bytes on those tracks (logically referred to as double-density); the other is using a read/write head on each side of the diskette so that you can store information on both sides of the diskette without removing it from the drive (a "dual-sided' disk drive). Utilizing both techniques gives you a double density, dual-sided system.

The physical machine that enables you to perform formatting and read data from or put data on a diskette is the disk drive. Some lay flat so that the diskette is horizontal within the drive (like a record on a record player); others are on edge so that the diskette is vertical within the drive (turn the record player on its side). Regardless of the orientation, drives have common characteristics.

The actual drive mechanisms are protected in casings that may have air circulation slots cut in them to vent the heat from the machinery inside. They also have gates or doors through which you insert the diskette into the drive and which serve to protect the diskette from foreign particles. Small LEDs on the front of the drives indicate when the drive is operating.

Inside the casing you have: a drive motor and hub assembly which rotates the diskette within its jacket at speeds of 300 to 3600 rpm depending on the size and cost of the drive; a stepper motor that controls the movement of the read/write head across the surface of the diskette; the magnetic read/write head itself; various LEDs for the index hole and write-protect notch; and, generally, circuitry to control read/write functions, speed, etc.

The controller (a fancy term for the little doodads that make electrical impulses do what they have to do) translates microcomputer requests for data into physical operations the drive has to perform in order to retrieve or store that data.

If, for instance, you type DIR (TRS-80 command for a directory listing of a diskette) or CATALOG (same function for the Apple) on your keyboard, your CPU tells the controller you want to look at the directory of the diskette. The controller translates this command into a sequence of steps, some of which make the drive motor bring the diskette up to speed, make the stepper motor advance the read/write head the physical distance needed to position the head over the directory track, lower the head, read the data in the directory and then send that information back to the CPU.

The commands themselves are the fourth part of the disk system: the Disk Operating System. DOS is the software th: makes the three other aspects of a disk system come together

by allowing all the mechanical gadgets in the system to operate efficiently. A good DOS interprets user commands, allows you to input and output to the diskette, and provides useful routines to make the handling of all those 1s and 0s on the diskette fast, efficient and meaningful. Without a good DOS all you have is a bunch of mechanical and electronic gadgets that do little more than take up room on your systems desk.

If we use an analogy of people working in an office, the scenario for the operations a DOS performs would go something like this.

With no disk system or DOS, you have a one-room office with a single employee called Basic. Basic is a versatile worker and performs a wide variety of operations in that office. Basic can handle filing, routing of memos and numerous data for the output of reports.

With the addition of a DOS, however, Basic's office becomes just one room in a large building. Basic is the head person in a particular office, but DOS is the manager for the company. If DOS feels Basic's skills and abilities are needed, DOS calls on Basic. DOS may also call on other offices. DOS coordinates all the efforts of each office in the building and oversees the actions of everyone in the building.

Depending on what you require from the company (the microcomputer), you will work in different ways. Sometimes you have to visit just Basic's office and sometimes you have to deal directly with DOS but whether you see DOS personally or not, the manager still controls the efforts of the rest of the offices.

Most of the information presented has concerned floppies. Hard disk principles are "essentially" (I can hear the hardware people quibbling already) the same as those for floppies: hard disks are designed to store and retrieve data in a permanent form. The differences between the two types of disks are mainly in the technological manner in which those principles are met.

Hard disks, which have greater storage capacities than their more flexible kin, are also much faster than floppies. Two of the reasons for the increased speed are faster rotation, 3600 rpm compared to 360 rpm, and the fact that you don't generally lose time by having to lower the read/write head so that it can interpret or distribute data. The space between the read/write head and the disk is so small that the slightest bit of matter on the disk's surface can cause problems. (To get a visual idea of the tolerances, see Figure 3.)

To protect the environment of the hard disk and the drive, hard disks are usually sealed in a protected casing from which the disk cannot be removed.

While the capacity, speed and protection enclosure of hard disks are great strengths of that technology, they have also been detriments to some extent.

If your system crashes with a floppy diskette in it, you can always take out the crashed diskette, pop a backup copy into the drive and off you go again. (Making backups is probably the most important single rule in using external storage devices.) With a hard disk, things become a little more complicated. If a hard disk system crashes, it crashes. The disk is in the enclosure and you can't get it out — at least not with most of today's systems for micros. Even making backups of your data gets to be a problem. Where do you put all the data a megabyte hard disk can carry?

Some computerists recommend high speed, digital tape units for backing up files; others suggest additional hard disks; still others call for floppy diskette drives in addition to the hard disk. Whatever way you decide is best for your particular application, a lot of thought and dollars will be involved in deriving the most utility from a machine using a hard disk.

There is no doubt that developments in technology will affect the future status and use of floppy disks but for the immediate future, it looks as though improvements will continue to be made in such areas as increased storage capacity. As bubble memory drops in price and becomes increasingly available, the faster access of that medium will probably affect the future of floppies on the low-capacity side while corresponding advancements in hard disk technology will affect storage of a high-capacity nature. The most likely event to occur will be that all the different technologies will exist together with each serving particular markets.

There have been recent indications that the current demand for floppies (especially mini disk drives meeting the budget allowances and storage needs of the personal computer user) will cause increasing demands on available supplies and some industry leaders are predicting there will be scarcity of drives as early as December of this year.

If you have been toying with the idea of obtaining disk drives for your microcomputers, start planning for the future so that you won't be caught in a supply and demand crunch.

Disk Dos and Don'ts

BY PAUL ARMSTRONG

Drives

1. Do not place your disk drives near sources of electromagnetic radiation such as a color television or display monitor. Keep the drives as far from such sources as possible — at least three feet.

2. Do not attempt to clean the read/write heads of a disk drive with anything other than a "cleaning diskette" designed for that purpose. Such diskettes are available from several different companies. For the hardware types who insist on getting into the interior of machinery, never clean a head with anything other than pure denatured alcohol (*not* rubbing alcohol) and a perfectly clean cotton swab. If you insist on doing the cleaning yourself, exercise extreme caution because even a slight scratch could ruin the head.

3. Clean a read/write head manually only when problems develop. Cleaning, no matter how carefully done, can scratch a head slightly. If you're using a cleaning diskette, follow manufacturer's instructions.

4. Have your drives checked by a qualified technician every six months. There are several delicate adjustments that should be made periodically. Moving the drives around, or just the vibration from normal operations, throws these adjustments off, cutting down the reliability of the drive, thereby causing read/write errors to occur more frequently.

5. Avoid plugging your system into non-constant or fluctuating power sources. Ideally, your computer system should be the only appliance drawing power from its circuit. However, as this is not usually possible, at least avoid putting the computer on a circuit with appliances such as air conditioners or refrigerators which may cause sudden power fluctuations.

6. Keep your drives away from:
moisture or extreme heat or cold; all chemicals; any

Mr. Armstrong is repair manager for Computer City, Charlestown, MA.

small foreign objects such as room dust, smoke, ashes, etc.

7. If a drive develops a problem (read errors, scratched diskettes, etc.), have it serviced as soon as possible or valuable software may be lost.

8. When a drive has been aligned, it may have difficulty reading software used with the drive prior to its being adjusted. Copy files on the aligned drive as soon as possible.

9. If you have multiple drives, it is best to have them aligned at the same time so that all alignments "lean" in the same direction.

Diskettes

10. Use only the stickers provided to write protect a diskette. Do not use masking tape or other kinds of tape for this function because drives utilizing LEDs to sense the protect status can read through the tape. While some drives use a mechanical means of sensing the write protect status of a diskette, most use LEDs.

11. Keep diskettes away from electrical and magnetic equipment (use Rule 1 as a guide). Do not put disks on televisions, monitors or digitizing tablets.

12. When using a bulk eraser on a diskette, stay far away from diskettes you do not wish to erase.

13. As a general rule, do not turn your drives on and off with diskettes inside them. With the Apple, the CPU controls the read/write head but in the TRS-80, the CPU has no control of the head during power up and that lack of control can cause problems. Read your owner's manual but when in doubt, power up first, then put the diskettes into the drives.

14. Keep your diskettes in a protected environment when not in use. There are various products designed for the protection and storage of diskettes.

15. Never place any object on a diskette.

16. Store diskettes in a vertical position (withing the mentioned protected environment).

17. Avoid writing on a diskette. If you must change a label, make up the label first and put it over the old label or make your changes with a felt tip pen only.

18. If a diskette has been in a cold environment, allow it to remain at room temperature for one-half the time (to a maximum of 2 hours) it has been exposed to the cold before using it in a drive.

19. If a diskette is scratched inadvertantly, copy those files recoverable to a new diskette and discard the damaged diskette. If you then have problems reading your new diskette, have the head cleaned as it may have picked up particles from the damaged diskette.

20. Never touch the exposed surface of a diskette; handle a diskette by the jacket only.

Cables

21. Be extremely cautious when handling your ribbon cables from the drives to your CPU. If you are packing your drives for transportation to another site, take the cables off the drives but be extra careful with the connectors as a gold pin that has been crushed or damaged will make the cable inoperable. The best situation is to have the drives equipped with extender cards that allow cables to attach both to the drives and the CPU. If you can't, treat cables and equipment with extreme caution. □

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- Program chaining.
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- Compatible with NEWDOS & TRSDOS.
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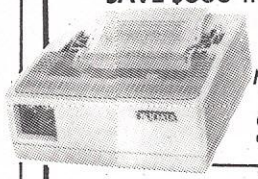

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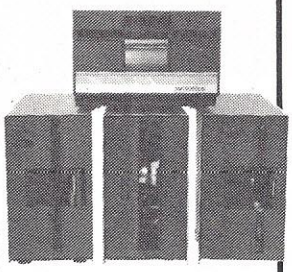

Shugart SA400 with power supply and chassis, the disk that Radio Shack sells for $499 SAVE $130	$369
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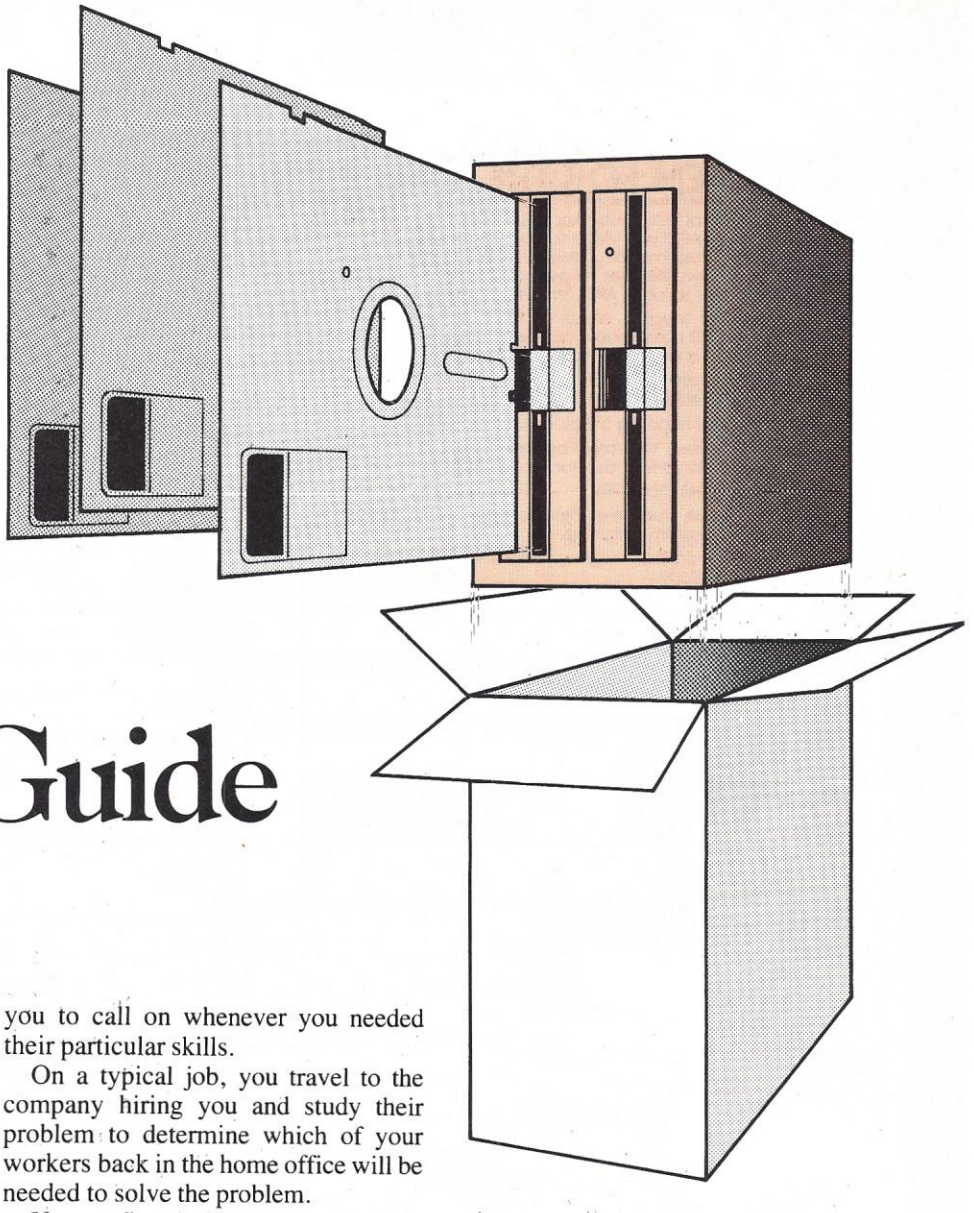

Disk Drive Buyer's Guide

BY KEN MAZUR

Are disk systems worth the money they cost? Should you get one?

The answer to both questions, like most answers in the microcomputer field, is "That depends." It depends on what you do with your micro and what you plan to do with the machine.

If you're a hobbyist who's sole use of the machine consists of electronic files (name and address lists, household records, recipes, etc.), games, basic bookkeeping functions, uncomplicated tax computations, or educational purposes (such as having a micro around so the kids become computer literate or have help in specific subject areas), the answer could be "Maybe disks aren't worth all that money" because there are cassette-based programs that handle the above quite efficiently.

The problems with a cassette recorder-based micro is that it just doesn't have the speed of a disk machine.

Suppose you were a microcomputer consultant who traveled around the country a lot helping people solve a variety of problems in applications programming, machine language programming, educational applications, etc. You have an excellent firm and can provide all these services because you have a number of experts available for you to call on whenever you needed their particular skills.

On a typical job, you travel to the company hiring you and study their problem to determine which of your workers back in the home office will be needed to solve the problem.

If your firm is just starting out and you have budgetary limitations (you're spending most of your money on obtaining the skills of many experts) maybe all you can afford to transport your skilled people to and from the jobs you contract for is a bicycle. The bike does the job but it's slow and some of the real experts who could work for you won't because they won't ride bikes.

If you expand your operation to include even more services for your customers you may then be able to afford a fast delivery (somewhat on the order of a company jet) method of getting your people on site to solve their portion of the problem. With a jet, you can whip these experts back and forth to the job site and be more concerned with getting the job done than worrying about waiting for the expert to arrive.

If you translate the above situation to using a microcomputer, a cassette recorder is the bicycle and a disk drive is the jet. The cassette works fine and gives you the ability to call up many different capabilities but a disk lets you do more, faster.

Without mass storage capabilities and speed of transfer such as those offered by disks, you'll only be realizing part of the potential a microcomputer offers.

Essentially, the home computerist has to ask, "Do I want to spend my time making my micro do things or do I want to spend most of my time *waiting* for it to do those things?" The answer will determine how much you're going to have to spend.

For the businessperson, there's no avoiding the need for disks. A micro used in business requires mass storage and high access speed. The only question a businessperson need consider is, "Which models, in what configuration, does my business require?" Only after careful analysis of the data your business manipulates (volume, immediacy of need, variety, etc.) will you be able

Illustration by David Bastille

to determine how many, what type, and what size disk system you need.

Microcomputers can handle everything from accounting to word processing and do so with dispatch and efficiency but only if the proper equipment is available.

To give you a representative sampling of the disk field, we have included a comparison chart of disk systems in this issue.

The chart (take a look at it now to get a feel for how it's formatted) provides information you'll have to consider before purchasing a disk system.

Each system listed contains the following information:

"Company Name" and "Model" are self-explanatory.

The "First Unit Price" is the end user, single unit, retail cost for the microcomputer's first disk. Cost of subsequent drives is found under "Additional Units." These prices are guides only. In many cases "deals" can be found from vendor to vendor and in some instances, the purchase of two drives at the same time will result in a lower price than simply combining the costs would indicate. Shop around before you purchase.

The column labeled "Sides" will contain either a "D" or an "S" to indicate whether the system is dual sided or single sided. If it is dual sided, data may be read from or written on both sides of the disk without removal from the drive. If the system is single sided, only one side of the disk is used.

"Density" will also be indicated with an "S" or a "D" to show whether a system utilizes single density or double density. Density means bytes per track and a double density system is one which has twice as many bytes per track (a byte is a character) as the system would have using a single density technique. You can get more information on a double density diskette than you can on a single density version even though the physical size of the disk remains constant.

"Tracks" indicates the number of tracks available with a system. In the case of dual sided systems, the number of tracks is the total number found by adding the number of tracks on each side of the disk.

"Sectors" is the number of subdivisions each track is divided into by the system while "Bytes per Sector" indicates the number of characters each of the sectors will hold.

"Formatted Storage Capacity" is the total number of bytes a disk can contain after it has been formatted by the system. Formatting is overhead needed to enable the system to process your data accurately and efficiently.

"Sectored" contains either an "S" or and "H." "S" means the system utilizes a soft sectored technique (a single index hole) and "H" means the system uses the hard sectored technique (an index hole for each sector). The two techniques are not compatible.

"Access Time" is the average time interval between the instant data are called for from the storage unit and the instant data are delivered. It is also the average interval between the instant data are requested to be stored and the instant at which storage is completed. The time interval is in milliseconds (a millisecond is one thousandth of a second).

"Transfer Rate" is the speed at which accessed data can be moved from one device to another. If the column shows a transfer rate of 250Kbits, it means the system transfers 250 thousand 1s and 0s per second. If the column has 250Kbytes, it means the system transfers at a speed of 250 thousand "characters" (a character usually consists of 8 bits) per second.

"DOS Supplied" shows whether a disk operating system is included with the purchase of the disk system ("Y" for yes, "N" for no). If a DOS is supplied, the particular operating system provided will be found in the "DOS Compatible" column in boldface type.

The "DOS Compatible" column shows which operating systems may be used with a disk system. If a DOS is listed in boldface type, the DOS comes with the disk system. DOSs listed in regular typeface are operating systems that will work with the disk system but you must purchase the operating system of your choice on your own.

"Memory Recommended" lists the amount of internal memory (your microcomputer's internal memory) the disk supplier recommends for use with the disk system. A disk operating system often takes up a lot of room in your micro's memory, so you have to have a sufficient amount for both the operating system and your own programs.

"Machine Compatibility" indicates with which microcomputers a disk system may be used with no user modification necessary.

As is the case with just about every piece of equipment you purchase for your microcomputer, be absolutely sure you know what you get for the money you will be paying: check.

Disk Vendor Guide

Apple Computer, Inc.
10260 Bandley Dr.
Cupertino, CA 95014
(408) 996-1010
Circle 200

Commodore Business Machines
3330 Scott Blvd.
Santa Clara, CA 95051
(408) 727-1130
Circle 201

Computer Distributors, Inc.
P.O. Box 9194
Austin, TX 78766
(512) 345-9279
Circle 202

Corvus Systems
900 S. Winchester Blvd.
San Jose, CA 95128
(408) 946-7700
Circle 203

Custom Electronics, Inc.
238 Exchange St.
Chicopee, MA 01013
(413) 592-4761
Circle 204

Intek Co.
P.O. Box 8766
Newport Beach, CA 92660
(714) 551-1325
Circle 205

Matchless Systems
18444 S. Broadway
Gardenia, CA 90248
(213) 327-1010
Circle 206

Midwest Scientific Instruments
220 W. Cedar
Olathe, KS 66061
(913) 764-3273
Circle 207

North Star Computers, Inc.
2547 Ninth St.
Berkeley, CA 94710
(415) 549-0858
Circle 208

Parasitic Engineering
Box 6314
Albany, CA 94706
(415) 527-6134
Circle 209

Percom Data Co., Inc.
211 N. Kirby
Garland, TX 75042
(214) 272-3421
Circle 210

Quay Corp.
P.O. Box 386
Freehold, NJ 07728
(201) 681-8700
Circle 211

Radio Shack
1400 One Tandy Center
Fort Worth, TX 76102
(817) 390-3272
Circle 212

Sirius Systems
P.O. Box 9748
Knoxville, TN 37920
(615) 577-1072
Circle 213

Tora Systems, Inc.
29-02 23rd Ave.
Astoria, NY 11105
(800) 221-1340
Circle 214

Vista Computer Co.
1401 Borchard St.
Santa Ana, CA 92705
(800) 845-8017
Circle 215

VR Data, Inc.
777 Henderson Blvd.
Folcroft Industrial Park
Folcroft, PA 19032
(215) 461-5300
Circle 216

Disk Drive Comparison Chart

5-1/4" FLOPPY

Company	Model	First Unit	Add Units	Sides	Density	Tracks	Sectors/Track	Bytes/Sector	Formatting Storage Unit #1	Sectored	Access Time	Transfer Rate	DOS Supplied	DOS Compatibility	Memory Recommend	Machine Compatible
Custom Electronics Inc.	Atari CX-810	699.95	699.95	S	S	40	18	128	80.625	S	236 ms	6000 Kbits	Y	**Atari DOS**	16K	Atari 800
North Star Computers	Horizon 1D-32K	2695	500	S	D	35	10	512	180	H	566 ms	250 KBytes	Y	**North Star DOS** OASIS, CP/M, MPM, NS Pascal	32K	Any S-100 Bus computer
	Horizon 1Q-32K	2995	725	D	D	70	10	512	360	H	167 ms	250 KBytes	Y	**NS DOS** OASIS,CP/M, MPM, NS Pascal	32K	NS/Any S-100 Bus computer
VR Data Corp	VR Data 514	380	350	S	S	40	10	256	91.5	S	75 ms	125 Kbits	N	TRSDOS, NEWDOS, CP/M, TPM	16K	RSI
Quay Corp.	Model 500*	2500*	495	S	D	40	5	1024	205	S	370 ms	250 Kbits	Y	**CP/M 2.2**	32K	Quay 500
	Model 502*	3200*	695	D	D	80	5	1024	410	S	370 ms	250 Kbits	Y	**CP/M 2.2**	32K	Quay 502
PerCom Data Co. Inc.	TFD-100	399	399	D	S	80	10	256	204.8	S	370 ms	125 Kbits	N	PerCom OS-80, TRSDOS, NEWDOS, CP/M	16K	Z2/H8/NS/SW/TI/RSI/VG
	TFD-200	675	675	S	S	77	10	256	197.12	S	780 ms	125 Kbits	Y	**PerCom OS-80** TRSDOS, NEWDOS	16K	Z2/H8/NS/SW/TI/RSI/VG
	LFD-400	599	399	D	S	80	10	256	204.8	S or H	370 ms	125 Kbits	Y	**PerCom MPX & system diskette** PerCom Index, TSC mini FLEX, FLEX 2.0, FLEX 9.0, Smoke Signal Broadcasting DOS	8K	All 6800/6809 SS-50 bus computers including SWTP, Smoke Signal Broadcasting, MSI & GIMIX
	LFD-800	895.95	1549.95*	S	S	77	10	256	197.12	S or H	780 ms	125 Kbits	Y	**PerCom MPX (ROM) & system diskette** (same as above)	8K	(same as above)
	LFD-800 EX	945.95	650	S	S	77	10	256	197.12	S or H	780 ms	125 Kbits	Y	(same as above)	8K	6800/6809 S-86 bus computers
	LFD-400 EX	649.95	400	D	S	80	10	256	204.8	S or H	370 ms	125 Kbits	Y	(same as above)	8K	(same as above)
Midwest Scientific Instruments Inc.	MSI System 7 MFD-8	5923 Dual drive only	—	S	Quad	77	16	256	315	S	100 ms	25 Kbits	Y	**MSI FDOS** SDOS, FLEX	56K	MFD-8 is an integral part of the MSI 6800A/System 7 Computer system and is not a stand-alone unit
Sirius Systems	80+1	350	350	S	S	40	10	256	102	S	75 ms	125 Kbits	N	TRSDOS, NEWDOS	16K	RSI
	80+2	420	420	D	S	70	10	256	179	S	75 ms	125 Kbits	N	TRSDOS, NEWDOS	16K	RSI
	80+3	450	450	S	S	80	10	256	204	S	75 ms	125 Kbits	N	TRSDOS, NEWDOS 80 track patch included	16K	RSI
	80+4	550	550	D	S	160	10	256	409	S	75 ms	125 Kbits	N	TRSDOS, NEWDOS 80 track patch included	16K	RSI
Tora Systems	MPI 51	379	379	S	S	40	10	256	102	S	75 ms	125 Kbits	N	TRSDOS, NEWDOS	16K	RSI
	Shugart SA400	379	379	S	S	35	10	256	89.6	S	298 ms	125 Kbits	N	TRSDOS, NEWDOS	16K	RSI
Vista Computer Co.	V 200 (single)	695	395	S	D	40	10	512	189	H	75 ms	250 Kbits	Y	**Vista CP/M (VOS)**	24K	Sol-20/NS Horizon Sorcerer/Imsai 8080
	V 200 (double)	859	559	D	D	80	10	512	278	H	75 ms	250 Kbits	Y	(same as above)	24K	(same as above)

	V 80	395	395	S	S	40	10	256	102	S	12 ms	125 Kbytes	N	TRSDOS, NEWDOS Lifeboat CP/M	16K	RSI, RSII Heath H-8, H-11	
Radio Shack	Mini-Disk System	499	499	S	S	35	10	256	85.7	S	200 ms	12.5 KBytes	Y	**TRSDOS** NEWDOS	16K	RSI	
Apple Computer Co.	Disk II	595	495	S	S	35	13	256	116	S	—	—	Y	**DOS 3.2.1** Visicalc	16K	AP2/AP2+	
Commodore	Model 2040 (Two drive system)	1295	1295	S	—	35	17-21	—	340		—	300 Kbytes	Y	**DOS 1.0** 2.1 DOS is hard-ware with 8K ROM & 4 K RAM	8K	Pet	
	Model 8050 (Two drives)	1695	1695	S	—	77	23-29	—	1 MByte		—	—	Y	**16 K ROM built in and 4 K RAM DOS 3.0**	8K	Pet	
Matchless Systems	MS-800 (Mod II)	1095	500	S	D	77	26	256	509	S	260 ms	500 KBytes	N	TRS-80 Mod II CPM 2.0	32K	Z2/IM/NS/RSII	8" FLOPPY
	MS-800 (Mod I)	1695	500	S	S	77	26	128	250	S	260 ms	250 KBytes	Y	**CPM 1.4** CPM 2.2 (Extra)	32K	RSI	
	MS-800 (Apple)	1645	500	S	S	154	26	128	250	S	260 ms	250 KBytes	N	Apple 3.1 or 3.2	48K	AP2/AP2+	
Computer Distributors	Wizard Model 3	1895	800	D	S	77	26	128	516	S	260 ms	256 Kbits	N	Apple DOS	48K	AP2	
	Wizard 2+2	1695	800	S	S	77	26	128	256	S	260 ms	256 Kbits	N	Apple DOS	48K	AP2	
VR Data Corp.	VR Data 800	899	600	S	D	77	26	256	490	S	—	—	Y	**Either TRSDOS, CP/M or TPM**	—	RSII	
Quay Corp.	Quay 900	4995*	2495*	D	D	154	8	1024	1.25 MB	S	96 ms	500 Kbits	Y	**CP/M 2.2**	48K	Quay 900	
PerCom Data Co. Inc.	TFD-8	995	839	S	S	77	15	256	292	S	230 ms	250 Kbits	Y	**PerCom OS-8** TRSDOS, NEWDOS w/PerCom mod to support 8" disk syst.	32K	RSI uses PerCom TFD-8 adapter card (no extra charge) which installs in Expansion Interface, RSII uses cable supplied with TFD-8	
Midwest Scientific Instruments Inc.	MSI FD-8	1675	1260	S	S	77	16	256	315	H	80 ms	256 Kbits	Y	**MSI FDOS** SDOS, FLEX	56K	SW/MSI-6800	
	MSI FD-8A	2250	1750	D	D	154	30	256	1200	S	50 ms	50 Kbits	N	SDOS	56K	MSI 6800	
Parasitic Engineering	MAXI DISK	995	845	—	—	77	—	—	290	—	83 ms	250 Kbits	—	CP/M, TRSDOS	—	RSI	
Intek Co.	RFD 2000	635	590	S	S	77	NA	128	250	H	91 ms	250 Kbits	N	Varies (contact firm)	—	Varies (contact firm)	
	RFD 2001	655	609	S	D	77	NA	128	500	H	91 ms	500 Kbits	N	(same as above)	—	(same as above)	
	RFD 4000	845	825	D	S	154	NA	128	500	H	91 ms	250 Kbits	N	(same as above)	—	(same as above)	
	RFD 4001	865	844	D	D	154	NA	128	1000	H	91 ms	500 Kbits	N	(same as above)	—	(same as above)	
Corvus Systems Inc.	11AP	5350	3690	NA	NA	1050	18	512	9500	S	50 ms	400 Kbits	N	Apple DOS & Pascal	32K	AP2/AP2+	8" HARD
	11S	5350	3690	NA	NA	1050	18	512	9500	S	50 ms	400 Kbits	N	OASIS, CP/M 1.4, 2.0 MPM, Northstar DOS	32K	Z2/IM/NS/Sol/ES/VG/Altos	
	11T	5350	3690	NA	NA	1050	18	512	9500	S	80 ms	400 Kbits	Y	**NEWDOS w/Mod I** NEWDOS+, CP/M 1.4, 2.0, MPM, OASIS	32K	RSI, RSII	
Midwest Scientific Instruments Inc.	MSI HD-8/RH	7895	7000	D	D	408	24	256	10 MBytes	H	10 ms	250 Kbits	N	SDOS, FLEX	56K	MSI 6800	OTHER
VR Data Corp.	1500	Call	Call	D	—	—	8-32	520 to 2K	10 MBytes	S	35 ms	1562 Kbits	Y	**TPM** CP/M	—	RSII	
North Star	Marksman	9329	4999	D	D	—	—	512	18 MBytes	S	78 ms	250 KBytes	Y	**North Star HDOS** OASIS, MPM, CP/M2, NS Pascal	64K	NS	
Computer Distributors	Wizard Ten	4795	4795	D	S	—	—	—	10 MBytes	—	—	—	N	Apple DOS	48K	AP2	

*=2 drive system.

AP2=Apple II; **AP2+**=Apple II+; **ES**=Sorcerer; **H8**=Heath H8; **IM**=Imsai; **NS**=North Star; **RSI**=Radio Shack I; **RSII**=Radio Shack II; **SW**=SWTP 68/2; **TI**=Texas Instruments 99/4; **VG**=Vector Graphic Vector I; **Z2**=Cromemco Z2

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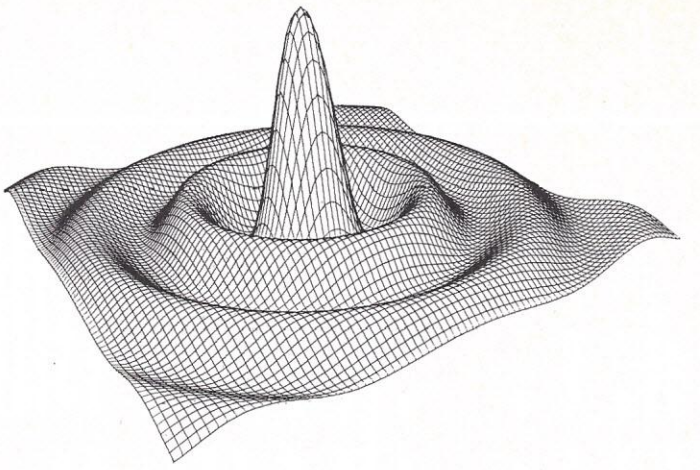

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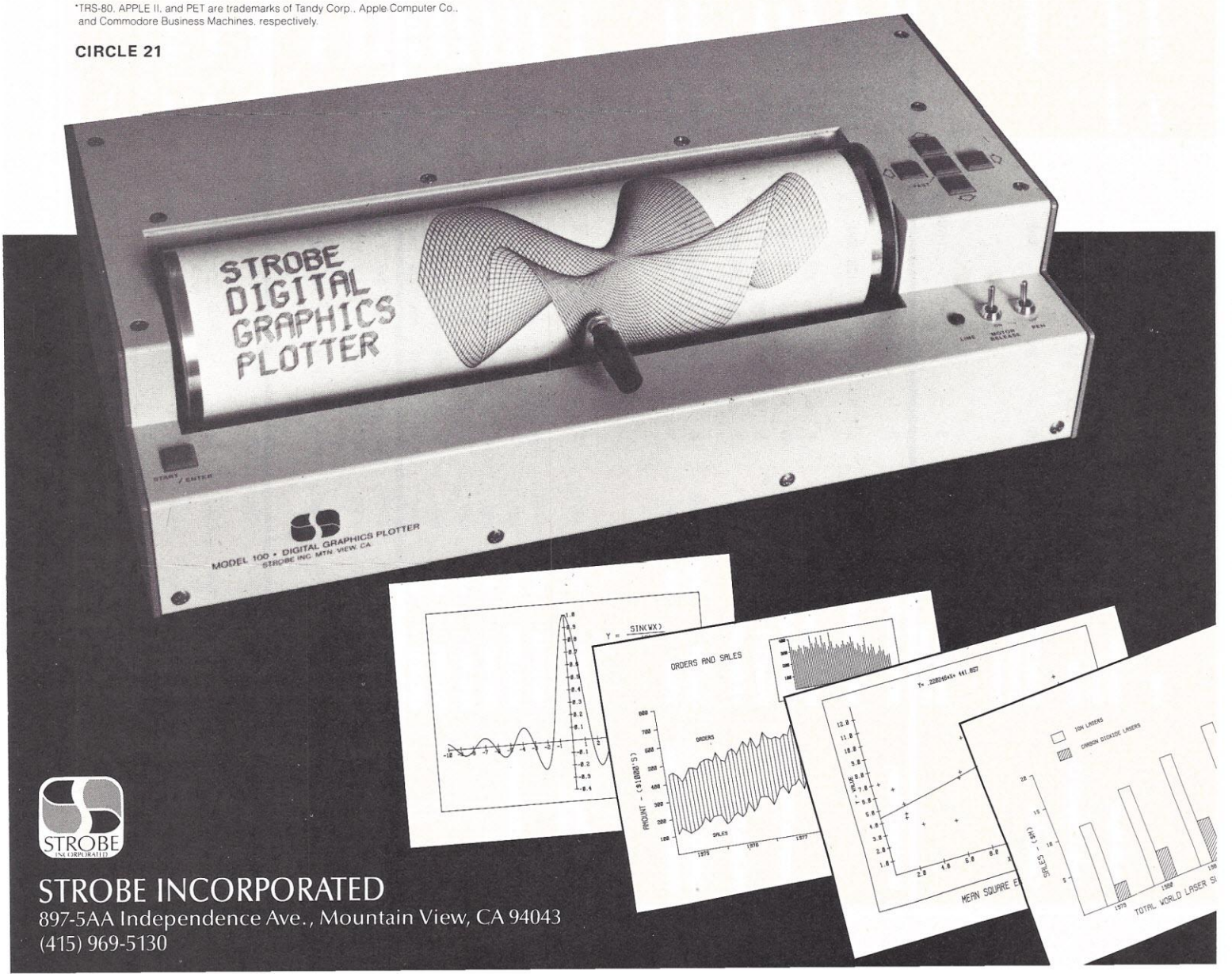

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Behind the Dazzling Displays

A Look at Color Graphics

BY TRACY R. LICKLIDER

High resolution graphics! 16 colors! What do these computer graphics claims by personal computer makers mean? Can you duplicate in Basic the dazzling, multicolor demonstration programs that play continuously in nearly every computer store? We investigate the Apple, Atari, OSI, and TI personal computers to discover the truth about color graphics.

Exact claims vary from computer to computer, but they are generally misleading to the extent that they suggest that you can have all 16 colors simultaneously in a high resolution display. The Atari only allows two colors at its highest resolution. The Apple uses six. The OSI and TI do not even support true high resolution graphics. Moreover, writing dazzling, fast-moving color gaphics programs in Basic is not particularly easy with any of these computers.

Let's begin with the issue of "resolution." Resolution refers to the number of individuals accessible elements or points in a display. (Note that the resolution, in this sense, does not refer to the number of physical points or phosphors on a TV set.) Usually resolution is expressed as some number of horizontal display elements by some number of vertical display elements. For example, the Atari offers a highest resolution of 320 horziontal points by 192 vertical points; thus the display consists of 61,440 points each of which can be individually set. The key requirement is that each display element be individually and separately setable; setting one point must not change any other point.

The Apple, in its high resolution graphics mode, offers 280 × 192 resolution. The OSI C4P claims an "effective graphics resolution" of 256 × 512 points. The catch in this claim is the word "effective." In fact, the OSI offers 64 lines of 32 characters. Each character position is in turn divided into an 8 × 8 matrix of dots. However, the dots that make up a character cannot be set independently of one another, and you are limited to the 256 patterns of dots that are produced by the OSI character generator. You cannot, for instance display a pattern of dots in which only the four corner dots are turned on.

The TI 99/4 makes an ambitious claim of "24 lines of 32 characters with 8 × 8 resolution." Like the OSI, the TI does not support true high resolution graphics with its Basic. However, unlike the OSI, the TI does let you define and display your own 8 × 8 character patterns. This gives you an indirect (and rather awkward) ability to set the points within a character position independently from one another. However, this still does not give you the ability to set any point in the display independently from every other point. Nevertheless, a clever and sufficiently motivated programmer could emulate 256 × 64 resolution by redefining the display patterns of all 256 character codes and then displaying the redefined patterns in 8 rows of 32 characters.

Yet, at these high resolutions, Atari and TI allow only two colors in the display and Apple allows only six. (It is

important to note that, while the Apple offers six colors, those six colors are fixed and cannot be changed by the programmer; the Atari and TI, which allow only two colors, at least let you choose any two colors out of the possible 16 colors.) This brings us to the second issue, color.

All four of these computers can display 16 colors, but the catch is that they cannot use all 16 colors simultaneously under Basic in a high resolution display. The reason that the number of colors is limited at high resolution is that these computers used a fixed amount of memory to store the instructions on how to make up the display. Given a fixed amount of memory, there is a direct tradeoff between the resolution (or number of points to be displayed) and the number of available display colors. In a two color display, each point in the display requires only one bit to indicate its color (if the bit is zero, use the first color; if the bit is one, use the second color). This means that the colors of eight points can be stored in one byte (cell) of memory. A four color display requires two bits to indicate the color of one point; the colors of only four points can be stored in one byte of memory. Similarly, a sixteen color display would require four bits to indicate the color of each point, and the colors of only two points could be stored in a byte. To use all 16 colors at the Atari's highest resolution of 320 × 192 would require 30K (K=1024 bytes) of memory to hold the display instructions!

In order to have more colors in the display, all of these computers offer low resolution graphics modes. In these modes the tradeoff is made in favor of more colors and results in fewer displayable points. In fact, as the resolution drops, the "points" turn more and more into blocks of color. The OSI and TI really only have low resolution modes. The OSI can display 32 × 64 or 32 × 32 blocks in 16 colors. The TI displays 32 × 24 blocks in 16 colors; the TI has only this one mode. The Apple offers 40 × 48 resolution in 16 colors. Thus, at low resolution, the Apple, OSI, and TI can show a display involving all 16 colors simultaneously. Unlike the others, Atari cannot under Basic simultaneously display all 16 colors no matter which of its 5 resolutions is used. The best the Atari can do is 5 simultaneous colors in its lowest resolution, 20 × 24. In its other resolutions, the Atari is limited to 2 or 4 colors. However, at least you can choose which 2, 4, or 5 colors you will use from the 16 possible colors. Also, the Atari lets you set the luminance (i.e., brightness) of each color it displays to one of eight luminance levels for their colors. Of course, with the Atari, a program could cycle through a sequence of displays which used all 16 colors, but, at any given moment, a display could involve at most five colors.

A third issue is how much memory is used up by these computers for color graphics. The Apple, OSI, and TI use fixed size memory areas to hold the display image. In high resolution, the Apple uses 8K. The OSI uses 4K and the TI less than 1K. The Atari is the only one that uses a variable amount of memory depending on the resolution. At its lowest resolution, the Atari only uses 261 bytes for a 5 color 20 × 12 display. At its highest resolution, Atari uses nearly 8K. This range of memory consumption enables Atari to offer middle range resolution graphics on systems with only 8K of user memory. On the OSI the 4K of video memory is separate from user memory. This allows low resolution graphics on OSI systems with only 4K of user memory. On a 16K Apple or Atari allocation of 8K to high resolution graphics will significantly restrict the size and complexity of the Basic program that creates the graphics.

The final issue is how easy or hard it is to write color graphics programs in Basic on these computers. Writing fancy graphics programs in Basic is not particularly easy on any of these computers. Also writing programs in Basic that achieve the dazzle and speed of some of the Atari and TI cartridge programs may simply be impossible because the cartridge programs have the speed advantage of graphics functions inaccessible from Basic.

Among these four personal computers, the Apple offers the largest number and best repertoire of Basic commands for doing graphics functions. Unfortunately, the commands for low resolution actions are different from those for the equivalent action in high resolution. For example, you use the command PLOT to plot a point in low resolution but use HPLOT to plot a point in high resolution. Similarly, COLOR sets the prevailing color in low resolution while HCOLOR sets it in high resolution. In low resolution, the commands HLIN and VLIN draw horizontal and vertical lines respectively. These cannot be used in high resolution. In low resolution, PLOT can only plot one point. In high resolution, HPLOT can

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plot a series of points or draw a vector from the last plotted point to a specified point. GR enters low resolution display mode. HGR enters high resolution mode. Normally a text window is left at the bottom of screen, but a POKE command can be used to switch to all graphics after either GR or HGR. SCRN returns the color of a specified point on the screen. These commands are easy to use and make plotting functions and drawing simple displays relatively straightforward.

The Apple has two memory areas for low resolution displays and Apple with 24K or more can have two areas for high resolution. The image on the screen can be displayed from either memory area, and a POKE command is used to switch from using one memory area to the other. You can switch from one high resolution area to the other by using the HGR (area 1) and HGR2 (area 2) commands. With this two area feature, you can be displaying an image from one area while updating while updating or creating a new image in the other. This can be used to achieve cleaner animation effects that can be had on the other computers, none of which offer this feature.

The Apple has commands to define and draw shapes. A shape is defined as as a sequence of steps up, down, left or right. With each defined step, you also specify whether a line should be displayed during the step or whether the step should be invisible. Once defined, a shape is referred to by number. You can have up to 255 shapes defined at a time. You can draw the shape by giving the command DRAW N AT X, Y (where N is the shape's number and X and Y specify the origin position for the shape on the screen). You can also rotate, scale up or down, and undraw shapes. These are quite powerful capabilities; the catch is that defining a shape is not that easy. You have to graph out the shape, break down the graph into a series of steps (up, down, right, left, visible or invisible), convert the series of steps into hexadecimal codes, and finally type the codes into memory using the monitor. Trying to do all this just using graph paper, pencil and hex codes to draw a complicated animation will probably be too tedious and frustrating. Most of the fancy Apple display software you see in computer stores was not developed by hand but rather by using digitizers and high level software that helped define shape tables.

The Atari offers the next best repertoire of Basic commands for doing color graphics. The Atari has nine display modes, which are set by the GR command. Unlike the Apple, the Atari commands are the same regardless of the resolution. This allows you to achieve some interesting effects by executing the same sequence of graphics commands and just varying the resolution argument to the GR command. The PLOT command plots a point, and the DRAWTO command draws a vector from the last plotted point to a specified point.

Unlike with the Apple, the Atari COLOR command does not set a prevailing color in which all subsequent points are plotted (up to the next COLOR command). Instead the Atari COLOR command specifies a color register. All points plotted subsequent to this COLOR command (up to the next COLOR command) are associated with this register and will be displayed in the color and luminance indicated in that color register.

The Atari approach introduces a level of indirect specification of the color for a point.

The SETCOLOR command is used to set the color and luminance of a color register. This indirect color approach can be used to achieve fast and interesting effects. You can change all the blue points to yellow without replotting them (as you would have to do on an Apple) simply by executing a SETCOLOR command to change the color in the color register which controls the blue points. Regrettably, in an unusual lapse of human engineering, Atari made this color register scheme unduly confusing to use. The SETCOLOR command takes three arguments: the number of the luminance value for that color (also loaded into the color register). The COLOR command takes one argument, a number, which turns out not to be a color register number. SETCOLOR 1, . . .does not necessarily set the color of the points plotted after a COLOR 1 command. In fact, the correspondence betwen SETCOLOR arguments and COLOR arguments is different in each of the nine graphics modes. As a result you will spend a lot of time looking up the right values in the Basic reference manual. Most Atari owners still do not have the reference manual and only have the Atari Basic Self-Teaching Guide, which only explains the SETCOLOR and COLOR commands for graphics mode 3.

Other Atari Basic commands include POSITION, PUT, and GET, which position the cursor to a point on the screen, output a byte at the cursor position, and get the byte at the cursor position. LOCATE returns the argument of the COLOR command that controls the color of a specified point on the screen. There is also a neat but bizarre in syntax command to fill in a shape with the color of its border. The command is XIO 18,6,0,0 "S". (The XI0 command is a general purpose input/output command; its last argument specifies the device to operate on; in this case "S" is the screen.) It is also possible to use POKEs to set graphics parameters, colors and display margin.

The TI 99/4 comes in a distant third in terms of Basic commands for graphics programming. All graphics actions are done by CALLs. CALL HCHAR (X,Y,C,Z) plots the character C at row Y column X and at Z successive horizontal positions. If Z is greater than the number of positions remaining on the line, the plotting continues at the left edge of the next line. In effect, HCHAR plots a horizontal "line" made out of the character C. CALL VCHAR is similar to HCHAR and plots a vertical "line" made out of a character. CALL CLEAR clears the screen (i.e., it sets all 32 × 24 character position positions to the default background color). CALL SCREEN sets the entire screen to a specified color. CALL COLOR sets the foreground and background colors for one of the sixteen groups of eight characters. The foreground and background colors can be any of the 16 possible colors. If they are set to the same color, then any character in that character group will display as a solid block of color. For example, the characters A and B are in the same group and they will always be displayed in the same color. In effect, TI's approach of assigning color to the character groups is similar to Atari's color registers. The indirection is achieved by plotting characters from different character groups. All blue As can be changed to yellow by simply changing the color assigned to As character group; the As do not have to be replotted with HCHAR (or VCHAR).

Finally, the CALL CHAR commands lets you define your own 8 × 8 dot pattern for any of the 256 character codes. This lets you develop small gaming symbols. For instance, you can redefine the character A so that it displays as a little man. The display color of the redefined character is still defined by the character's group. You could have blue As and red As by redefining some character outside As group to be the same pattern of dots as an A. Then you could assign blue to As group

and red to the redefined character's group. A real A would be displayed in blue; a redefined A would display in red. Unfortunately, redefining a character is a bit clumsy. You have to translate your desired 8 × 8 dot pattern into a string of hexadecimal digits and use that string as an agrument in the CALL CHAR command. Nevertheless, the character redefinition and indirect color by character group do give speed and flexibility to the graphics.

The OSI C4P finishes last in terms of Basic commands for graphics programming. There are none! All graphics is done by POKEing values into the dedicated video display memory. To plot a character at a position X,Y, you first have to calculate the address of that character position in video memory. Then you POKE the character into that address. You also POKE the foreground and background colors for that character into the calculated address plus 4096. All line drawing has to be done with FORNEXT loops. Yet the OSI makes up somewhat for its lack of graphics commands and lack of true high resolution graphics by offering a rich set of 150 special graphics symbols in addition to the usual upper and lower case letters, numbers and punctuation. These special symbols include tanks, guns, planes, a parachutist, the USS Enterprise and other figures used in making games. Low level but effective animation can be achieved easily by using these built-in special symbols; you can set up air battles and space wars much more easily on the OSI than with any of the other computers.

While these computers differ significantly in color graphics capabilities and programability, it is only fair to point out that they also differ in price. The $600 Atari 400 is surprisingly close to the abilities of the $1200 Apple, and the limited features of the OSI C4P may seem acceptable given its $700 price. In the price/performance comparison the TI 99/4 seems to suffer; at $1200 (including a monitor), it does not match the Apple or Atari 800 in features or ease of use.

Color graphics draw people to personal computers. Color graphics is a key selling point for personal computers especially in the consumer computer market. However, consumers must be wary. They must read the user manuals. As noted above, a boast of 16 colors and high resolution graphics is not necessarily a claim of 16 colors simultaneously nor necessarily a claim of 16 colors at highest resolution. Consumers must not be misled by the speed and dazzle of demonstration programs written in machine language and using features inaccessible from Basic. Nevertheless, by being aware of the issues of resolution, simultaneous colors, and programmability, consumers can buy any of these personal computers and get low cost color graphics capabilities that meet their needs. □

Graphics Add-Ons

Ohio Scientific 540 Video Display

Ohio Scientific Inc.
1333 S. Chillicothe Rd.
Aurora, OH 44202
(216) 562-3101

Ohio Scientific offers the video display interface from its Challenger IIP as a fully-assembled accessory for any OSI system. The 540 display features a 32 row by 64 column display of the 64 character ASCII font in 5 × 7 matrix form. The 540 optionally supports a graphics generator character which features lower case and about 170 special characters. *Circle 220*

Flashwriter

Vector Graphic, Inc.
790 Hampshire Rd.
Westlake Village, CA 91361
(805) 497-6853

Flashwriter generates a video display of 1024 characters (16 lines by 64 characters) and uses a 7 × 9 dot matrix to produce display images. In addition to alphanumeric displays, it can generate character-by-character, reversed video, reduced intensity, block and line graphics. Compatible with most S-100 bus computers. *Circle 221*

High Resolution Graphics Interface

Cromemco Inc.
280 Bernardo Ave.
Mountain View, CA 94043
(415) 964-7400

Cromemco's Super Dazzler Interface (SDI), a high-resolution graphics interface for use in Cromemco computer systems, displays color or black-and-white images with up to 756 by 484 point resolution. In color operation, up to 4096 colors can be selected. In nybble-mapped mode any 16 of the 4096 colors may be displayed in a single picture. In bit-mapped mode any two of these colors may be displayed in a single picture. For black-and-white nybble-mapped mode there can be 16 shades of gray. *Circle 222*

Color Graphics Interface for TRS-80

JFF Electronics
001 CN Towers
Saskatoon, Canada S7K 1J5

Geared to the hobby computer market, this PC board, developed by JFF, offers software selectable operating modes. The high resolution mode can display 128 × 192 matrix in one of two sets of four colors or it can be traded off to 256 × 192 maximum resolution in two colors. In lower resolution, modes of up to eight colors are available. Characters are alphanumeric in two colors and reverse video. *Circle 223*

VP-590 Color Board

RCA Cosmac
New Holland Ave.
Lancaster, PA 17604

The VP-590 Color Board increases the capabilities of the RCA VIP personal computer to include color and allows you to select one of three background colors for display, then specify one of eight foreground colors for each of 64 screen areas. Any bit turned on in an area will be displayed in the foreground color while "off" bits will display the background color. *Circle 224*

High Resolution Pet Graphics

Micro Technology Unlimited
841 Galaxy Way
PO Box 4596
Manchester, NH 03108
(603) 627-1464

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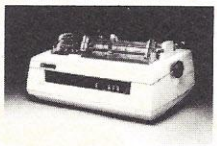

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High Resolution Graphics for TRS-80

Programma International Inc.
3400 Wilshire Blvd.
Los Angeles, CA 90010
(213) 384-0579

The 80-Grafix Board gives TRS-80 Model I owners a high resolution screen capability. 80-Grafix gives an effective screen of 384 × 192 points as opposed to the 127 × 47 matrix normally found with the Model I. The board also gives you lower case characters or you can create your own set of 64 original characters using the character generator package. *Circle 226*

Low-Cost Impact Printer

Integral Data Systems, Inc.
14 Tech Circle
Natick, MA 01760
(617) 237-7610

The Model 440 Paper Tiger printer interfaces to the Apple II, TRS-80 and other personal computers. This commercial-grade tractor-feed printer features an optional DotPlot graphics package providing full dot plotting capability at low additional cost.

Paper Tiger's graphics package gives the user individual dot control. With the ability to manipulate every matrix dot on the printed page, a wide range of graphics — from bar codes and block letters to complex illustrations — can be printed. The 2K buffer, included with the graphics option, holds a full CRT screen. *Circle 227*

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Hewlett-Packard Co.
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Palo Alto, CA 04303
(415) 856-1501

Hewlett-Packard produces several printers useful in graphic applications.

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The Model 9876A prints at speeds up to 480 full lines per minute with high resolution (77 dots per inch) characters upon high contrast, fade resistant paper. It is a stand-alone version of the built-in printer of the HP System 45 Desktop Computer, and is designed for external use with HP's 9825 and new System 35 desktop units. The 9876A was also designed for use with other computers from Hewlett-Packard and those manufactured by other companies by utilizing two interfacing modes, 8-bit parallel and IEEE-488-1975 (HP-IB). *Circle228*

Video Printer

Axiom Corp.
5932 San Fernando Rd.
Glendale, CA 91202
(213) 245-9244

A compact, low-cost video printer that reproduces any monotone graphic or alphanumeric display in any language and character font without hardware or software interface to the CRT is available from Axiom Corp. The EX-850 Video Printer's video controller connects directly to the video signal of any raster scan CRT display and samples information on the screen at high speed. The printer prints whatever is on the screen. Applications include hard-copy graphics for medical and chemical analysis; generation of maps, logos, histograms and charts; ticket printing; and printing for all foreign language character fonts and special characters.

Axiom's MicroPrinters and Micro-Plotters have built-in interfaces for TRS-80, Apple II and Pet. The units come with cable and connector, and plug into the microcomputer with no modification to hardware or software.

Model EX-801 MicroPrinter has upper and lower case alphanumeric characters plus the graphic symbols used by the TRS-80, Apple II and Pet. The EX-820 MicroPlotter goes a step further, providing precise alignment for both horizontal and vertical dot patterns for a true hard copy of computer generated graphics. *Circle 229*

Three-Mode Printer

Malibu Design Group Inc.
8900 Eton Ave.
Canoga Park, CA 91304
(213) 998-7694

Model 165 from Malibu operates in three modes: as a high-speed dot matrix printer at 165 characters per second; a reduced speed, letter-quality dot matrix printer at 90 cps; or a full-graphics matrix printer.

Applications for the Model 165 include computer portraits, custom character sets (Japanese, Katakana, music symbols and so forth) and high-density characters for word processing. Complete dot control is provided for 60 × 72 dots/inch, said the company.

Interfaces include a card for Apple computers, a serial RS-232/ASCII parallel controller card and an S-100 bus I/O card. *Circle 230*

Graphics Thermal Printer

Dataproducts Corp.
6219 DeSoto Ave.
Woodland Hills, CA 91364
(213) 887-8451

A graphic option for the microprocessor-controlled Dataproducts T-80 thermal matrix printer permits interspersed graphics and text at low cost. The graphic printer can be used for quick-look evaluation of engineering, scientific, medical and industrial data or for other applications where immediate examination of plotted information is desired.

The T-80 is a five-by-seven dot matrix printer which operates at 80 characters per second. Both vertical and horizontal spacing is 70 dots per inch giving 4900 points per square inch. Distance between points is 0.014 inch. The printer uses conventional 8-3/4″ wide thermal-paper rolls.

Standard interfaces include 8-bit Dataproducts or Centronics-type parallel interfaces and an RS-232 20 mA current loop interface. *Circle 231*

Light Pens

3G Company
Rt. 3, Box 28a
Gaston, OR 97119
(503) 662-4492

A self-contained light pen, which adds versatility to graphics programs and games, plugs directly into the Commodore Pet 2001 user port. The light pen allows users to bypass the Pet's keyboard and interact directly with information displayed on the CRT. The firm also markets versions for the TRS-80 and Apple. *Circle 232*

Digital Graphics Plotter

Strobe Inc.
897-5A Independence Ave.
Mountain View, CA 94043
(415) 969-5130

The Strobe Model 100 drum-type plotter offers high resolution with a step size of .004 inch, an 8-1/2 × 11 inch paper capacity and accepts a wide variety of pens. Its interactive digitizing

mode permits x-y coordinate data corresponding to pen position to be entered directly into the host computer. An applications package is available which features: flexible alphanumeric character generation; variable character sizes; horizontal and vertical character strings; 90 degree character rotation; axis generation and vector plotting. The Model 100 can be interfaced to any computer through two parallel 8-bit output ports and one 8-bit input port. Optional interfaces for Apple II, TRS-80 and S-100 bus computers are available. *Circle 233*

Apple II Light Pen

Programma International Inc.
3400 Wilshire Blvd.
Los Angeles, CA 90010
(213) 384-0579

An Apple II light pen is available for applications such as bar graphs, charts and games. The Light Pen is supplied with three demonstration programs on cassette. These demo programs exemplify the uses of the Pen, and aid in developing Basic programs to drive the pen. The first demonstration tells how to use the Light Pen as a menu selection tool. Second is a program of graphics demonstrations which permit the user to select from a menu of graphic shapes and colors. Selection from either the shape or color menu is accomplished by depressing the Return key. The third program is a graphics color bit-pad demonstration. *Circle 234*

Videostick X-Y Controller

Computer Plus
1324 South Mary
Sunnyvale, CA 94087

The Videostick X-Y controller for the Apple II features a large firing button and a high quality, long-life linear joystick designed for video applications such as plotting graphics or playing games. The controller plugs directly into the Apple II and can be hand held or table positioned. *Circle 235*

Graphic Terminal Emulator

ABW Corp.
PO Box M1047
Ann Arbor, MI 48106
(313) 971-9364

Teksim, a ROM-based device, enables your Apple II computer to emulate Tektronix 4010-series graphics terminals. Teksim, the "Tektronix Simulator", employs distributed processing in its programming approach and uses Apple's high resolution plotting capabilities. No modification to the host-resident program is required to display or input graphical data. Although the Apple has approximately one-fourth the resolution of a Tektronix terminal, a Teksim-Apple combination offers a substantial cost advantage plus features such as multi-colored displays, selectable erase and standard video output that lets any TV set function as a monitor. *Circle 236*

Apple Graphics Tablet

Apple Computer
10260 Bandley Dr.
Cupertino, CA 95051
(408) 996-1010

The Apple Graphics Tablet gives you a powerful tool for tasks ranging from digitizing circuit board schematics to creating high-resolution multicolored original art. The tablet, once installed, is ready to use with a standard software package written in Basic whenever you turn on your computer. The tablet can also be customized by you with special symbols and functions. The tablet features an 11 × 11 inch drawing surface, a coated mylar overlay containing a menu of tablet functions, a stylus, disk-based software and a printed circuit interface card. *Circle 237*

Disk Library Directory

BY RICHARD R. SYRIAC, SR.

How do you keep track of your disk programs? Do you take a directory check of each disk until you find the program you are searching for, or do you scribble the program names down on a piece of paper (which you can never find again)?

I created the following program to eliminate these problems. Although the program is designed to provide a TRS-80 disk user with a master directory of all disk programs, it can be modified for other systems, or to keep track of cassette based programs.

My diskettes are now double sided, thanks to the article "Doubling Space on Single-Sided Disks" in the June 1979 issue of *Personal Computing*, and therefore I have designed this program accordingly.

Before writing the Disk Index Program, I set down the following requirements:

1. The program must be easy to use.

2 It must provide the option of both video and hard copy output.
same basic format as obtained by the DOS-directory.

4. When you enter a program name, the computer must search the disk and display which disk the program is located on.

Since the program occupies slightly less than 7.5K of RAM, your TRS-80 disk system should have 32K bytes available, due to memory requirements of DOS and Basic.

Initialization

Line 120 contains the DIMension variable X. To determine your value for X, decide how many diskettes you will be putting into the index and multiply this value by 2.

Lines 170 through 210 contain the menu of options (see Sample Run 1).

Line 220 uses the INKEY function, which continuously strobes the keyboard looking for your input. You must press one of the options available or the computer will just keep looping at line 220. If you are a non-TRS-80 user, you may have to modify the lines using INKEY to INPUT with ON GOTO commands.

Create routine

Lines 320 through 540 contain the create routine. Line 320 branches to lines 1120 through 1160 which opens file DISC/TXT in random I/O mode, using buffer 1. Lines 1130 through 1150 refield buffer 1 sixteen different times, allowing us to place up to 16 filespecs on each directory. Lines 330 and 340 accept the disk number and side number for the disk file you want to create. The program then branches to lines 1640 through 1670, which convert the disk/side number to a record

Program Listing

```
110 CLEAR 600
120 X=30:'CHANGE THE VALUE OF <X> TO COINCIDE WITH THE NUMBER
    OF DISKS YOU HAVE * 2
130 DIM PR$(X), DISC$(X), SIDE$(X), GR$(X),P$(X),D$(X),G$(X)
140 '*******************>MENU<**********************
150 CLS:PRINT@470,"DISK INDEX":FOR T=1 TO 1000:NEXT
160 CLS
170 PRINT@270,"TO <C>REATE          TYPE <C>
180 PRINT@334,"TO <M>ODIFY          TYPE <M>
190 PRINT@398,"TO <V>IEW            TYPE <V>
200 PRINT@462,"TO <P>RINT           TYPE <P>
210 PRINT@526,"TO <S>EARCH          TYPE <S>
220 G$=INKEY$:IF G$=""THEN 220  ELSE IF G$="C"THEN 320
    ELSE IF G$= "V" THEN 590  ELSE IF G$="M" THEN 950  ELSE IF
    G$="P" THEN 1680 ELSE IF G$= "S" THEN 1490 ELSE IF G$<>""THEN 220
230 '
240 '
250 '
260 '
270 '*******************>CREATE ROUTINE<******************
280 '
290 '
300 '
310 '
320 GOSUB 1120
330 CLS:PRINT@470, "ENTER DISK #";:INPUTD$
340 CLS:PRINT@470,"ENTER SIDE #";:INPUT S$
350 CLS
360 GOSUB 1640
365 PRINT@8,"<DISK #";D$;">";:PRINT@40,"<SIDE #";S$;">";
370 GOSUB 2020
375 LSET SIDE$=S$
377 LSET DISC$=D$
380 FOR N=1 TO 16
390 PRINT@785,"ENTER PROGRAM #";N
400 PRINT@835,"USE <[><ENTER>  TO BACKSPACE TO PREVIOUS ENTRY"
410 PRINT@J2,"";
420 LINE INPUT P$(N):IF LEN(P$(N))<1 THEN 1370
430 LSET PR$(N)=P$(N)
440 PRINT@J2,PR$(N)
450 IF P$(N)=CHR$(91)THEN N=N-1:J2=J2-32:T8=191:FOR E2=1 TO
    2:FOR B=J2 TO J2+30: PRINT@B,CHR$(T8);:NEXT:T8=32:NEXT:GOTO390
460 PRINT@785,"<<<ENTER GRANS>>>":PRINT@J2+18,"";:LINEINPUT G$(N)
470 LSET GR$(N)=G$(N)
480 PRINT@J2+18,GR$(N)
490 J2=J2+32
500 NEXT
510 CLS:PRINT@470,"WRITING TO DISK
520 PUT 1,NUX
```

```
530 CLS:PRINT@470,"ANY MORE ENTRIES <Y/N>":G$=INKEY$: IF G$="Y" THEN
    330  ELSE IF G$="N" THEN 540  ELSE IF G$="" THEN 530
540 CLOSE: GOTO 160
550 '
560 '
570 '
580 '
590 '********************>VIEW ROUTINE<******************
600 '
610 '
620 '
630 '
640 CLS
650 B4=0:PRINT@460,"DO YOU WISH TO VIEW ALL FILES <Y/N>":G$=INKEY$:
    IF G$=""THEN650
660 IF G$="N"THEN B4=1:GOTO 690
670 GOSUB 1120
680 FOR NU%=1 TO 500:T1=0:GOTO 740
690 GOSUB 1120
700 CLS:PRINT@465, "ENTER DISK # <ENTER 0 TO QUIT>";:INPUTD$:
    IF D$="0" THEN CLOSE: GOTO 160
710 T1=0
720 CLS:PRINT@465,"ENTER SIDE #";:INPUT S$
730 GOSUB 1640
740 GET1,NU%
750 CLS
760 GOSUB 2000
770 FOR N=1 TO 16
780 PRINT@J2,PR$(N);:PRINT@J2+19,GR$(N)
790 J2=J2+32
800 T1=T1+VAL (GR$(N))
810 NEXT
820 IF NU%=LOF(1) THEN PRINT@721,"*** END OF FILE ***"
830 PRINT@785,"<<";40-T1;"FREE GRANS>>"
840 IF B4=0 THENPRINT@840,"<<PRESS <C> TO CONTINUE <0> TO QUIT>>
845 IF B4=1 THEN PRINT@844,"<<PRESS ANY KEY TO CONTINUE>>
850 G$=INKEY$: IF G$="" THEN 850
860 IF NU%=LOF(1) OR G$="0"AND B4=0 THEN CLOSE:GOTO 160
870 IF B4=0 THEN NEXT NU%
880 GOTO 700
890 '
900 '*****************>MODIFY ROUTINE<******************
910 '
920 '
930 '
940 '
950 CLS:PRINT@460,"WHICH DISK WOULD YOU LIKE TO MODIFY";:INPUTD$
960 CLS:PRINT@470,"WHICH SIDE";:INPUTS$
970 GOSUB1640 :GOSUB 1120 : GET1,NU%:CLOSE
980 CLS
990 GOSUB 2000
1000 GOSUB 2050
1005 LSET SIDE$=S$:LSET DISC$=D$
1010 FOR N=1 TO 16
1020 PRINT@J2,N;PR$(N);:PRINT@J2+19,GR$(N)
1030 J2=J2+32
1040 NEXT
1050 PRINT@721,"TO MODIFY FILESPEC    TYPE <F>";
1060 PRINT@795,"TO MODIFY GRANS       TYPE <G>";
1070 PRINT@849,"TO QUIT & SAVE        TYPE <0>";
1080 G$=INKEY$:IF G$=""THEN 1080 ELSE IF G$="F" THEN 1170 ELSE IF
    G$="G" THEN 1260 ELSE IF G$="0" THEN 1090 ELSE IF G$<>""THEN1080
1090 GOSUB 1120
1100 PUT 1,NU%:CLOSE
1110 CLS:GOTO 170
1120 OPEN "R",1, "DISC/TXT"
1130 FOR I%=0 TO 16
1140 FIELD 1,(I%*15) AS DUMMY$, 12 AS PR$(I%), 3 AS GR$(I%)
1150 NEXT
1155 FIELD 1, 2 AS DISC$, 1 AS SIDE$
1160 RETURN
1170 J2=128:GOSUB2050 :PRINT@721,"ENTER FILESPEC NUMBER (2 DIGITS)";
1180 G$=INKEY$:IFG$=""THEN1180
1190 G1$=INKEY$:IF G1$=""THEN1190
1200 G2$=G$+G1$:N=VAL(G2$):N9=(N-1)*32
1210 T8=191:FOR E2=1 TO 2:FOR B=(J2+N9)TO(J2+N9+12):
    PRINT@B,CHR$(T8);:NEXT:T8=32:NEXT
1220 GOSUB2050 :PRINT@721,"**ENTER FILESPEC ":N;"**";
1230 PRINT@B-10,"";:LINEINPUT P$(N)
1240 LSET PR$(N)=P$(N)
1250 GOTO 980
1260 J2=129:GOSUB2050 :PRINT@721,"ENTER GRANS # <2 DIGITS>";
1270 G1$=INKEY$:IF G1$=""THEN1270
1280 G$=INKEY$:IF G$=""THEN1280
```

Continued

number used in PUTting the information on disk.

Lines 380 through 500 are for inputting your program filespecs and lengths in grans for the disk directory you are working with.

My particular printer prints a [in place of an ↑ as shown in line 400 and in Sample Run 2.

Line 420 accepts the current program filespec and tests its length. For example, if you have no more programs to add to this particular directory and have not entered the maximum of 16 filespecs, all you do is press Enter when prompted for the next filespec. Line 420 sees that the length of your inputted filespec is less than 1 and jumps to line 1370. Lines 1370 through 1390 set the buffer field to null for the remainder of the space allocated to the directory.

If, when entering filespecs and grans, you find that you made a mistake (we all make them), line 450 allows you to back up and reinsert the erroneous entry. First press the up arrow, then press Enter. To further describe this feature, let's examine Sample Run 2. In the example, disk 12 side 2 has been selected as the directory to be created. We are prompted to enter filespec number one, which is entered as DEMO/BAS. We are then prompted for grans, which has been entered as 4. The example shows that four filespecs have been entered and the program is prompting an input for filespec 5. Suppose filespec 4 should be RSM1/CMD instead of RSM/CMD. At this point, pressing up arrow/Enter erases filespec 4 from the video with a graphics effect and the correct filespec is entered. The example shows that RSM1/CMD has been entered and the prompt is now looking for filespec 5.

When you finish inputting directory data, line 520 writes the directory to the disk. Line 530 prompts with the option of creating more directories or terminating the create mode. If you choose to create additional directories the program returns to line 330. If you opt to terminate, the program returns to the main menu.

The create routine is used when you begin the program and want to create your index. It is also used whenever you wish to add new diskettes to the library.

You should enter directories sequentially into the index; if you skip around, the disk will contain garbage where the directories were skipped. Although not detrimental to operation, it could be confusing later when you use the program in its other modes.

Modify routine

Use this routine when you want to make a change to an existing directory. You'll have the option of adding, deleting or changing filespecs and/or grans. (It's assumed that the directory being modified has already been created with the create routine.)

Lines 950 through 1040 prompt input of disk number/side number for the directory to be modified. These values are converted to a record number, the record number is then fetched from disk and the information is placed on video.

Lines 1050 through 1080 contain the menu available for this routine. Again, the INKEY function is used, so all you have to do is press the desired key to branch to the selected subroutine.

Let's go through Sample Run 3 to see exactly how this routine works. The sample shows that Disk 12 Side 2 was selected as the directory being modified. After these two inputs, the video is cleared, the disk is read and the directory is displayed as shown. The display tells us that we're looking at the display for the selected disk and there are four filespecs out of a possible sixteen resident in the directory. In the next example a selection to modify a filespec was made by pressing the (F) key. The bottom portion of the video, which contains the menu, is erased and replaced by a prompt to enter the number of the filespec to be modified. The prompt requests that two digits be inserted to identify the filespec. Filespec four (RSM/CMD) was selected by entering the digits 04. The current filespec at 04 was erased graphically and the corrected filespec was entered. After entry of the correct filespec, the Enter key is pressed, the screen is cleared and the modified directory is displayed along with the menu. If satisfied with the modification, press the Q key to write the directory to disk. Modifying grans works basically the same as modifying filespecs.

View routine

This routine lets you review any one or all directories. Lines 650 and 660 accept your choice of operation. Variable B4 is a flag which is set to zero in line 650 and will remain a zero if the option selected is to view all directories. If the option selected is to view only one directory then B4 is set to one. B4 allows program lines to be used for both options, thus conserving memory.

T1 is a variable used for counting the number of grans used in the directory. T1 is set to zero in line 680 and is incremented by the value of the grans

```
1290 G2$=G1$+G$:N=VAL(G2$):N9=(N-1)*32
1300 GOSUB 2050 :PRINT@721,"**ENTER GRANS#";N;"**":PRINT@775,
     "PRESS <ENTER> TWICE TO SET GRANS TO ZERO"
1310 FOR B=(J2+N9+18) TO (J2+N9+20):PRINT@B," ";:NEXT
1320 G$=INKEY$:IF G$=""THEN PRINT@B-2,"**";:GOTO1310
1330 PRINT@B-2,G$;:LINEINPUT Z1$
1340 G$(N)=G$+Z1$
1350 LSET GR$(N)= G$(N)
1360 GOTO 990
1370 FOR K=N TO 16
1380 LSET PR$(K)="":LSET GR$(K)=""
1390 NEXT K
1400 GOTO 510
1410 '
1420 '
1430 '
1440 '******************>SEARCH ROUTINE<****************
1450 '
1460 '
1470 '
1480 '
1490 CLS:PRINT@460,"ENTER ENOUGH LETTERS TO IDENTIFY FILESPEC  ";:
     PRINT@594,"---->                <----";:PRINT@599,"";:
     LINEINPUTP9$:P$=LEFT$(P9$,3)
1500 CLS
1510 GOSUB 1120
1520 PRINT"PROGRAM";TAB(20)"DISK";TAB(30)"SIDE";TAB(40)"GRANS"
1530 FOR NUX=1 TO 500
1540 GET 1,NUX
1550 FOR N=1 TO 16
1560 IF P$=LEFT$(PR$(N),3) THEN PRINTPR$(N);
     TAB(20)DISC$;TAB(30)SIDE$;TAB(40)GR$(N)
1570 NEXTN
1580 IF NUX=LOF(1) THEN 1600
1590 NEXT NUX
1600 CLOSE
1610 PRINT"HIT ANY KEY TO CONTINUE"
1620 G$=INKEY$:IF G$=""THEN1620
1630 GOTO 160
1640 D=VAL(D$):S=VAL(S$): IF D=1 THEN NUX=S*D
1650 IF D>1 AND S=2 THEN NUX=S*D
1660 IF D>1 AND S=1 THEN NUX=2*D-1
1670 RETURN
1680 '
1690 '
1700 '
1710 '
1720 '**********************>PRINT ROUTINE<********************
1730 '
1740 IF PEEK(14312)>127 THEN CLS:PRINT@470,"ACTIVATE PRINTER":
     PRINT@531,"PRESS ENTER WHEN READY";:INPUT A$
1750 CLS:PRINT@460,"DO YOU WISH A PRINTOUT OF ALL FILES <Y/N>"
1760 G$=INKEY$:IFG$=""THEN 1760 ELSE IF G$="N"THEN B4=1:GOTO 1780
1770 GOSUB1120:FOR NUX=1 TO 500:T1=0:GOTO1810
1780 GOSUB1120
1790 CLS:PRINT@465,"ENTER DISK # <ENTER 0 TO QUIT>":INPUT D$:
     IF D$="0" THEN CLOSE:GOTO 160
1800 T1=0:CLS:PRINT@465,"ENTER SIDE#";:INPUT S$:GOSUB 1640
1810 GET 1,NUX:CLS:PRINT@470,"<WORKING>"
1820 LPRINT TAB(10)"<DISK #";DISC$">";TAB(50)"<SIDE #";SIDE$;">"
1830 LPRINT TAB(0)"<FILESPEC>";TAB(20)"<GRANS>";TAB(40)"
     <FILESPEC>"; TAB(60)"<GRANS>"
1840 J2=0
1850 FOR N=1 TO 16STEP2:LPRINT TAB(0);PR$(N);TAB(23);GR$(N);
     TAB(40);PR$(N+1);TAB(63);GR$(N+1):T1=T1+VAL(GR$(N))+VAL
     (GR$(N+1)):NEXT
1860 IF NUX=LOF(1)THEN CLS:PRINT@721,"***END OF FILE***"
1870 LPRINT TAB(25)"<<";40-T1;"FREE GRANS>>":LPRINT STRING$(80,"=")
1880 PRINT@844,"<<PRESS ANY KEY TO CONTINUE>>
1890 G$=INKEY$:IF G$=""THEN 1900
1900 IF NUX=LOF(1) AND B4=0 THEN CLOSE:GOTO 160
1905 LF=LF+1:IF LF=4 THEN LPRINT CHR$(12):LF=0
1910 IF B4=0 THEN NEXT NUX
1920 GOTO 1790
2000 '**************>HEADING ROUTINE<****************
2010 PRINT@8,"<DISK #";DISC$;">";:PRINT@40,"<SIDE #";SIDE$
2020 PRINT@64,"<FILESPEC>";:PRINT@79,"<GRANS>";:PRINT@96,
     "<FILESPEC>";: PRINT@111,"<GRANS>";
2030 J2=128
2040 RETURN
2050 '****************>CLEAR SCREEN ROUTINE**********
2060 PRINT@704,STRING$(192," ")
2070 RETURN
```

read in from the disk. Line 800 contains the total number of grans used by the directory. Line 830 subtracts the total grans used from the value of 40. This figure assumes that a diskette with no programs has 40 grans of usable space. If your version of DOS allows more than 40 grans then change line 830 accordingly.

Line 860 tests whether end of file has been reached or if you have elected to terminate sequential viewing of the directories. In either case the disk file is closed and the program returns to main menu.

This routine helps you search for free space on disks. See Sample Run 4 for an example of this routine.

Search routine

With this routine you input the name of a filespec you are searching for. Then the computer searches the disk and displays the location of the filespec. Actually, only the first three letters of your input are used as a comparison.

Line 1490 sets up the video for prompting an input. Lines 1530 through 1590 read the index from disk; if a filespec being read contains the same three letters as the truncated input filespec, the target filespec along with its grans, disk number and side number are displayed. This procedure continues until you reach the end of file. Therefore, all filespecs which have the same three letters will be placed on video. See Sample Run 5.

Print routine

This routine operates much the same as the view routine except the output is directed to the printer via the video. You are given the option of obtaining hard copy of a single directory, or if you desire, you may obtain hard copy of the entire index.

Line 1740 tests whether the line printer is active. If not, the video tells you to turn on the printer.

Line 1905 allows four directories to be printed per page and then form feeds the printer to the next page. □

Sample Run 1

```
EXAMPLE OF MENU DISPLAY


TO <C>REATE          TYPE <C>
TO <M>ODIFY          TYPE <M>
TO <V>IEW            TYPE <V>
TO <P>RINT           TYPE <P>
TO <S>EARCH          TYPE <S>

*****************************************
```

Sample Run 2

```
ENTER DISK #? 12←
*****************************************
ENTER SIDE #? 2←
*****************************************
       <DISK #12>                <SIDE #2>
<FILESPEC>     <GRANS>   <FILESPEC>     <GRANS>
←


ENTER PROGRAM # 1
USE <E><ENTER>  TO BACKSPACE TO PREVIOUS ENTRY
*****************************************
       <DISK #12>                <SIDE #2>
<FILESPEC>     <GRANS>   <FILESPEC>     <GRANS>
DEMO/BAS         ←


<<<ENTER GRANS>>>
*****************************************
       <DISK #12>                <SIDE #2>
<FILESPEC>     <GRANS>   <FILESPEC>     <GRANS>
DEMO/BAS         4       ←


ENTER PROGRAM # 2
USE <E><ENTER>  TO BACKSPACE TO PREVIOUS ENTRY
*****************************************
       <DISK #12>                <SIDE #2>
<FILESPEC>     <GRANS>   <FILESPEC>     <GRANS>
DEMO/BAS         4       BASIC1/CMD       5
BASIC3/CMD       5       RSM/CMD          5
←


ENTER PROGRAM # 5
USE <E><ENTER>  TO BACKSPACE TO PREVIOUS ENTRY
*****************************************
       <DISK #12>                <SIDE #2>
<FILESPEC>     <GRANS>   <FILESPEC>     <GRANS>
DEMO/BAS         4       BASIC1/CMD       5
BASIC3/CMD       5       ←
E


ENTER PROGRAM # 4
USE <E><ENTER>  TO BACKSPACE TO PREVIOUS ENTRY
*****************************************
       <DISK #12>                <SIDE #2>
<FILESPEC>     <GRANS>   <FILESPEC>     <GRANS>
DEMO/BAS         4       BASIC1/CMD       5
BASIC3/CMD       5       RSM1/CMD         5
←


ENTER PROGRAM # 5
USE <E><ENTER>  TO BACKSPACE TO PREVIOUS ENTRY
*****************************************
          ANY MORE ENTRIES <Y/N>
*****************************************
```

Sample Run 3

```
WHICH DISK WOULD YOU LIKE TO MODIFY? 12←
*****************************************
WHICH SIDE? 2←
*****************************************
       <DISK #12>                <SIDE #2>
<FILESPEC>     <GRANS>   <FILESPEC>     <GRANS>
 1 DEMO/BAS       4       2 BASIC1/CMD     5
 3 BASIC3/CMD     5       4 RSM1/CMD       5
 5                        6
 7                        8
 9                        10
 11                       12
 13                       14
 15                       16

        TO MODIFY FILESPEC    TYPE <F>
        TO MODIFY GRANS       TYPE <G>
        TO QUIT & SAVE        TYPE <Q>
*****************************************
       <DISK #12>                <SIDE #2>
<FILESPEC>     <GRANS>   <FILESPEC>     <GRANS>
 1 DEMO/BAS       4       2 BASIC1/CMD     5
 3 BASIC3/CMD     5       4 RSM1/CMD       5
 5                        6
 7                        8
 9                        10
 11                       12
 13                       14
 15                       16

      ENTER FILESPEC NUMBER (2 DIGITS)
*****************************************
```

Continued

Sample Run 3 continued

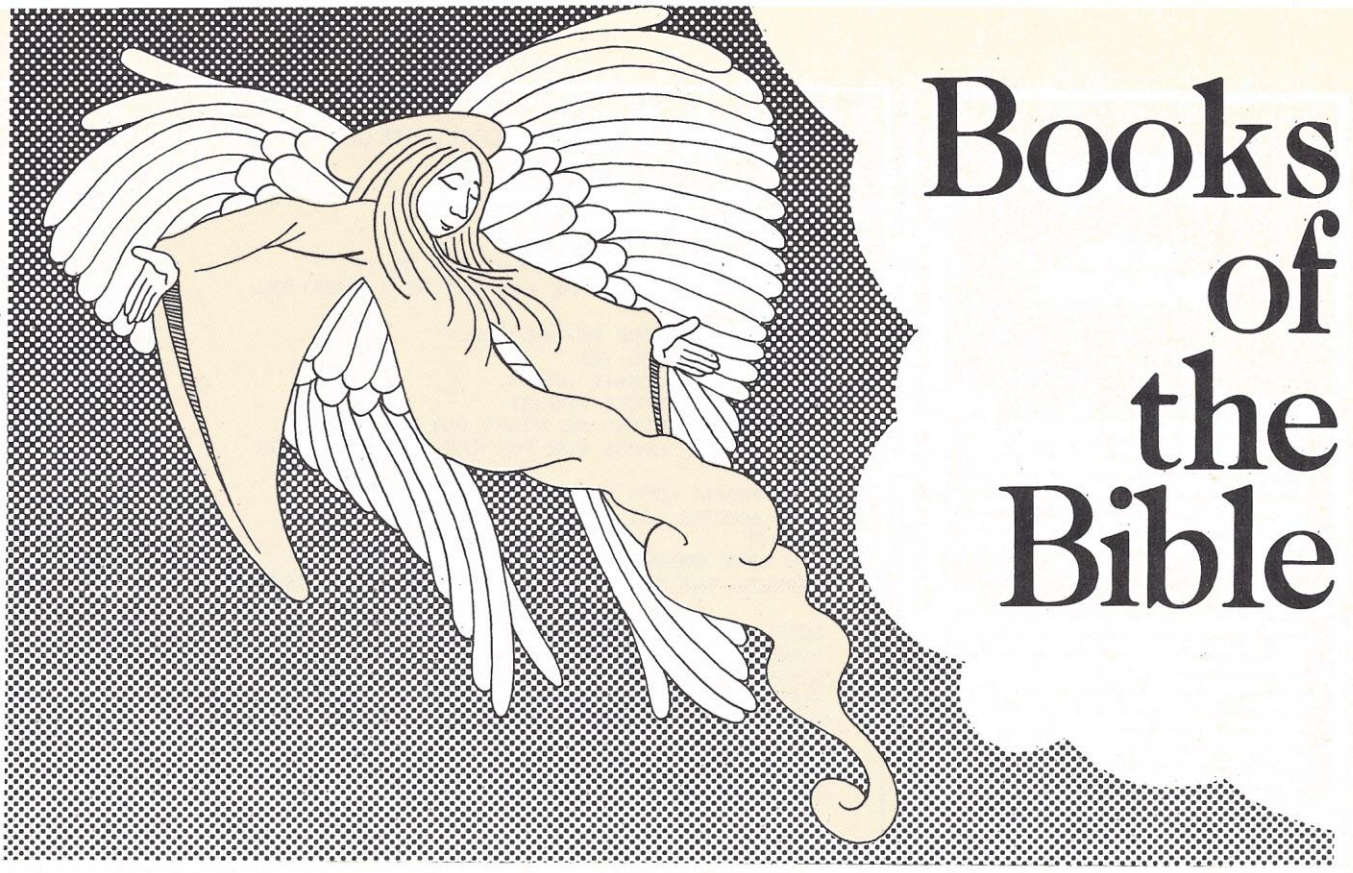
```
          <DISK #12>                    <SIDE #2>
<FILESPEC>       <GRANS>    <FILESPEC>       <GRANS>
 1 DEMO/BAS          4       2 BASIC1/CMD         5
 3 BASIC3/CMD        5         ←                  5
 5                             6
 7                             8
 9                             10
 11                            12
 13                            14
 15                            16

          **ENTER FILESPEC  4 **
*****************************************
          <DISK #12>                    <SIDE #2>
<FILESPEC>       <GRANS>    <FILESPEC>       <GRANS>
 1 DEMO/BAS          4       2 BASIC1/CMD         5
 3 BASIC3/CMD        5       4 RSM/CMD            5
 5                             6
 7                             8
 9                             10
 11                            12
 13                            14
 15                            16

        TO MODIFY FILESPEC    TYPE <F>
        TO MODIFY GRANS       TYPE <G>
        TO QUIT & SAVE        TYPE <Q>
*****************************************
```

Sample Run 4

```
DO YOU WISH TO VIEW ALL FILES <Y/N>
*****************************************
ENTER DISK # <ENTER Ø TO QUIT>? ←
*****************************************
ENTER SIDE #? ←
*****************************************
          <DISK #1 >                    <SIDE #2>
<FILESPEC>       <GRANS>    <FILESPEC>       <GRANS>
NEWDOS             -9       DIFGRAF/BAS          3
DIRCHECK/CMD        3       DIVUN1/BAS           3
DIVUN1/TXT          5       FORMAT/CMD           3
GRADES/TXT          2       LESPLAN/BAS          5
OBJECT/BAS          2       PRINT/BAS            1
STUBENCH/BAS        2       STUEQUIP/BAS         2
STUGRADE/BAS        4
COPY/CMD            1

        << 13 FREE GRANS>>
     <<PRESS ANY KEY TO CONTINUE>>
*****************************************
```

Sample Run 5

```
ENTER ENOUGH LETTERS TO IDENTIFY FILESPEC

      ---->←              <---
*****************************************
ENTER ENOUGH LETTERS TO IDENTIFY FILESPEC

      ---->BIO←          <----
*****************************************
PROGRAM              DISK       SIDE       GRANS
BIORYTH1             3          2          3
BIORYTH2             3          2          3
HIT ANY KEY TO CONTINUE
```



Books of the Bible

BY ROBERT LEVI SCHUMAN

Genesis, Exodus, Job, Psalms, Proverbs, Ruth — all are familiar books in the most popular book in the world, the Holy Bible. Obadiah, Micah, Nahum, Haggai and Joel, although not as well-known, are parts of the Bible too.

Perhaps you had to learn all these names in Sunday school. Or maybe you've tried to quickly find a certain verse during church service. This program will help you or your children learn all the books of the Bible and the order they come in.

You must answer the computer's questions by a "Y" for yes or an "N" for no. The computer tells you to depress the space bar when you are ready for the next question. If your answer is right, the program tells you and increments its record of the number of questions asked, along with its record of the number of questions answered correctly. If your answer is wrong, the program lets you know and gives hints that will help you get the question right if it comes up again. The computer's record of the number of questions asked will be incremented.

After the computer asks one hundred questions, the game is over. The number of questions asked and the number answered correctly are displayed after each question, allowing you to measure how well you know the books of the Bible. Also, this scoring can determine who among a group of people knows the books of the Bible best.

The program makes up the questions at random. Sometimes it will ask very simple questions, such as "Does Genesis come before Revelation?"; others will be more challenging. 4290 different questions (66×65) are possible.

The program could be modified to teach many other types of ordered information. For instance, the sequence of United States Presidents or the kings of Israel and Judah could be programmed using this technique. Perhaps you could program a method of teaching information ordered in two or more dimensions using an analogous technique. With this method, which is useful for teaching geography, the computer asks if a state is north of another state, then tells you if your answer was right or if the state was in another direction.

Sample Run

```
DOES ZEPHANIAH COME BEFORE OBADIAH?
YOUR ANSWER WAS YES.
SORRY, YOU GUESSED WRONG.
THE BOOKS ARE IN THIS ORDER:
     OBADIAH
     JONAH
     MICAH
     NAHUM
     HABAKKUK
     ZEPHANIAH
YOU HAVE ANSWERED 0 RIGHT OUT OF 1!
DEPRESS THE SPACE BAR FOR THE NEXT QUESTION.

DOES JOEL COME BEFORE ISAIAH?
YOUR ANSWER WAS NO.
RIGHT!
YOU HAVE ANSWERED 1 RIGHT OUT OF 2!
DEPRESS THE SPACE BAR FOR THE NEXT QUESTION.

DOES ISAIAH COME BEFORE II SAMUEL?
YOUR ANSWER WAS NO.
RIGHT!
YOU HAVE ANSWERED 2 RIGHT OUT OF 3!
DEPRESS THE SPACE BAR FOR THE NEXT QUESTION.

DOES SONG OF SOLOMON COME BEFORE LAMENTATIONS?
YOUR ANSWER WAS YES.
RIGHT!
YOU HAVE ANSWERED 3 RIGHT OUT OF 4!
DEPRESS THE SPACE BAR FOR THE NEXT QUESTION.

DOES TITUS COME BEFORE MATTHEW?
YOUR ANSWER WAS NO.
RIGHT!
YOU HAVE ANSWERED 4 RIGHT OUT OF 5!
DEPRESS THE SPACE BAR FOR THE NEXT QUESTION.

DOES PHILEMON COME BEFORE II CORINTHIANS?
YOUR ANSWER WAS YES.
SORRY, YOU GUESSED WRONG.
```

Continued

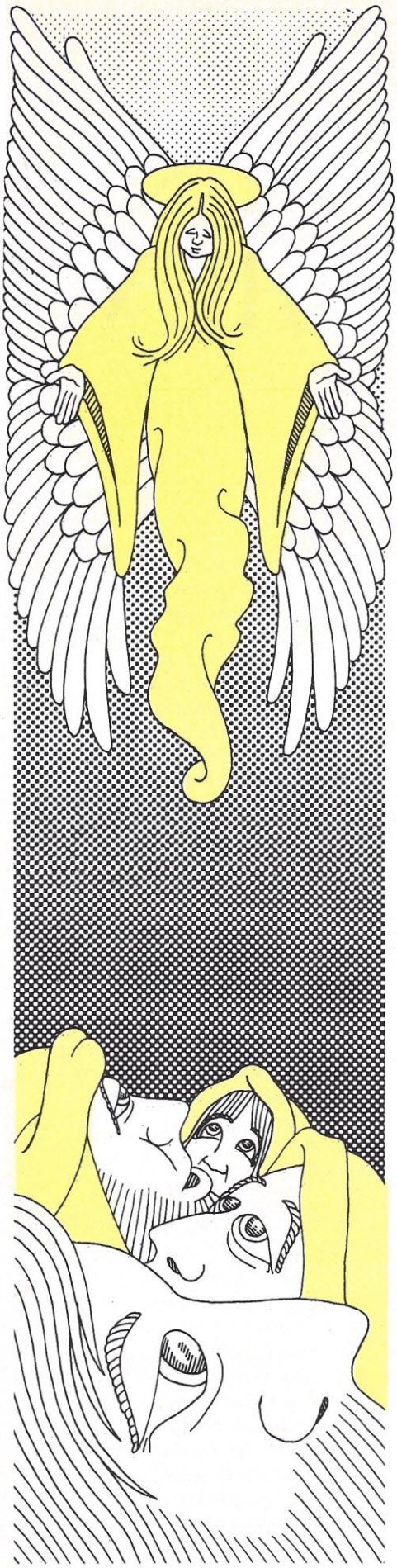
Illustrations by Josh Randall

Sample Run continued

```
DOES LUKE COME BEFORE REVELATION?
YOUR ANSWER WAS YES.
RIGHT!
YOU HAVE ANSWERED 95 RIGHT OUT OF 97!
DEPRESS THE SPACE BAR FOR THE NEXT QUESTION.

DOES HAGGAI COME BEFORE JOEL?
YOUR ANSWER WAS YES.
SORRY, YOU GUESSED WRONG.
JOEL COMES BEFORE HAGGAI.
YOU HAVE ANSWERED 95 RIGHT OUT OF 98!
DEPRESS THE SPACE BAR FOR THE NEXT QUESTION.

DOES NAHUM COME BEFORE II PETER?
YOUR ANSWER WAS YES.
RIGHT!
YOU HAVE ANSWERED 96 RIGHT OUT OF 99!
DEPRESS THE SPACE BAR FOR THE NEXT QUESTION.

DOES GALATIANS COME BEFORE EZRA?
YOUR ANSWER WAS NO.
RIGHT!
YOU HAVE ANSWERED 97 RIGHT OUT OF 100!
DO YOU WANT TO START OVER?

NO
HOPE YOU HAD FUN.   GOOD-BY FOR NOW.
```

Program Listing

```
100 CLEAR 777
110 C$ = "YOUR ANSWER WAS "
120 DEFINT B,N,R,T
130 DIM B$(66)
140 RANDOM
150 CLS
160 FOR N = 1 TO 66
170 READ B$(N)
180 NEXT N
190 T = 0
200 R = 0
210 CLS
220 B1 = RND(66)
230 B2 = RND(66)
240 IF B1 = B2 THEN GOTO 230
250 PRINT "DOES ";B$(B1);" COME BEFORE ";B$(B2);"?"
260 A$ = ""
270 A$ = INKEY$
280 IF A$ = "N" THEN PRINT C$;"NO. ":GOTO 320
290 IF A$ = "Y" THEN PRINT C$;"YES. ":GOTO 300
295 GOTO 270
300 IF B1 < B2 THEN GOTO 330
310 B = B1:B1 = B2:B2 = B:GOTO 350
320 IF B1 < B2 THEN GOTO 350
330 PRINT "RIGHT!"
340 R = R + 1:GOTO 1100
350 PRINT "SORRY, YOU GUESSED WRONG. "
360 IF B2 < 40 THEN GOTO 410
370 IF B1 > 39 THEN GOTO 720
380 PRINT B$(B1);" IS IN THE OLD TESTAMENT. "
390 PRINT B$(B2);" IS IN THE NEW TESTAMENT. "
400 GOTO 1100
410 IF B1 <> 1 THEN GOTO 440
420 PRINT "GENESIS IS THE FIRST BOOK IN THE BIBLE. "
430 GOTO 1100
440 IF B2 > 5 THEN GOTO 590
450 LET B = B1
460 GOSUB 500
470 LET B = B2
480 GOSUB 500
490 GOTO 1100
500 ON B GOTO 520,510,530,550
510 PRINT "EXODUS IS THE SECOND BOOK IN THE BIBLE. "
520 RETURN
530 PRINT "LEVITICUS IS THE THIRD BOOK IN THE BIBLE. "
540 RETURN
```



Program Listing continued

```
550 PRINT "NUMBERS IS THE F0URTH BOOK IN THE BIBLE. "
560 RETURN
570 PRINT "DEUTERONOMY IS THE FIFTH BOOK IN THE BIBLE. "
580 RETURN
590 IF B2 <> 39 THEN GOTO 620
600 PRINT "MALACHI IS THE LAST BOOK IN THE OLD TESTAMENT. "
610 GOTO 1100
620 IF B2 - B1 < 8 THEN GOTO 1010
630 IF B2 < 20 THEN GOTO 1090
640 IF B1 > 20 THEN GOTO 1090
650 IF B1 = 20 THEN GOSUB 700:GOTO 680
660 PRINT B$(B1);" IS IN THE FIRST HALF OF THE OLD TESTAMENT. "
670 IF B2 = 20 THEN GOSUB 700:GOTO 1100
680 PRINT B$(B2);" IS IN THE SECOND HALF OF THE OLD TESTAMENT. "
690 GOTO 1100
700 PRINT "PROVERBS IS AT THE MIDDLE OF THE OLD TESTAMENT. "
710 RETURN
720 IF B1 <> 40 THEN GOTO 750
730 PRINT "MATTHEW IS THE FIRST BOOK IN THE NEW TESTAMENT. "
740 GOTO 1100
750 IF B2 > 43 THEN GOTO 880
760 LET B = B1
770 GOSUB 810
780 LET B = B2
790 GOSUB 810
800 GOTO 1100
810 ON B - 39 GOTO 830,820,840,860
820 PRINT "MARK IS THE SECOND BOOK IN THE NEW TESTAMENT. "
830 RETURN
840 PRINT "LUKE IS THE THIRD BOOK IN THE NEW TESTAMENT. "
850 RETURN
860 PRINT "JOHN IS THE FOURTH BOOK IN THE NEW TESTAMENT. "
870 RETURN
880 IF B2 <> 66 THEN GOTO 910
890 PRINT "REVELATION IS THE LAST BOOK OF THE BIBLE. "
900 GOTO 1100
910 IF B2 - B1 < 8 THEN GOTO 1010
920 IF B2 < 53 THEN GOTO 1090
930 IF B1 > 53 THEN GOTO 1090
940 IF B1 = 53 THEN GOSUB 990:GOTO 970
950 PRINT B$(B1);" IS IN THE FIRST HALF OF THE NEW TESTAMENT. "
960 IF B2 = 53 THEN GOSUB 990:GOTO 1100
970 PRINT B$(B2);" IS IN THE SECOND HALF OF THE NEW TESTAMENT. "
980 GOTO 1100
990 PRINT "II THESSALONIANS IS AT THE MIDDLE OF THE NEW TESTAMENT. "
1000 RETURN
1010 IF B2 - B1 <> 1 THEN GOTO 1040
1020 PRINT B$(B1);" IS IMMEDIATELY FOLLOWED BY ";B$(B2);". "
1030 GOTO 1100
1040 PRINT "THE BOOKS ARE IN THIS ORDER:"
1050 FOR B = B1 TO B2
1060 PRINT "     ";B$(B)
1070 NEXT B
1080 GOTO 1100
1090 PRINT B$(B1);" COMES BEFORE ";B$(B2);". "
1100 T = T + 1
1110 PRINT "YOU HAVE ANSWERED";R;"RIGHT OUT OF";T;"!"
1120 IF T = 100 THEN GOTO 1170
1130 PRINT "DEPRESS THE SPACE BAR FOR THE NEXT QUESTION. "
1140 A$ = INKEY$
1150 IF A$ <> " " THEN GOTO 1140
1160 GOTO 210
1170 PRINT "DO YOU WANT TO START OVER?"
1180 A$ = INKEY$
1190 IF A$ = "Y" THEN GOTO 190
1200 IF A$ <> "N" THEN GOTO 1180
1210 CLS
1220 PRINT "HOPE YOU HAD FUN.  GOOD-BY FOR NOW. "
1230 DATA GENESIS, EXODUS, LEVITICUS, NUMBERS, DEUTERONOMY, JOSHUA
1240 DATA JUDGES, RUTH, I SAMUEL, II SAMUEL, I KINGS, II KINGS
1250 DATA I CHRONICLES, II CHRONICLES, EZRA, NEHEMIAH, ESTHER, JOB
1260 DATA PSALMS, PROVERBS, ECCLESIASTES, SONG OF SOLOMON, ISAIAH
1270 DATA JEREMIAH, LAMENTATIONS, EZEKIEL, DANIEL, HOSEA, JOEL, AMOS
1280 DATA OBADIAH, JONAH, MICAH, NAHUM, HABAKKUK, ZEPHANIAH, HAGGAI
1290 DATA ZECHARIAH, MALACHI
1300 DATA MATTHEW, MARK, LUKE, JOHN, ACTS, ROMANS, I CORINTHIANS
1310 DATA II CORINTHIANS, GALATIANS, EPHESIANS, PHILIPPIANS
1320 DATA COLOSSIANS, I THESSALONIANS, II THESSALONIANS, I TIMOTHY
1330 DATA II TIMOTHY, TITUS, PHILEMON, HEBREWS, JAMES, I PETER
1340 DATA II PETER, I JOHN, II JOHN, III JOHN, JUDE, REVELATION
1350 END
```

SOLVING CIPHERS

VROYLQJ FLSKHUV

BY CHARLES J. WILSON

We've been fascinated with codes and ciphers since grade school and through the years I have been the first in line to buy books that deal with code-breaking and code-making. To this day, I work on the cryptogram in the morning paper as I have my first cup of coffee. I have even written a Basic program for a TRS-80 to help me solve cryptograms.

Before I describe the program however, let's review some background information.

The terms "code" and "cipher" are often used as synonyms but there is a difference. With a cipher, the plaintext (the message to be hidden) is transformed letter by letter into the ciphertext (the disguised message) through the use of a cipher alphabet. As an example, Julius Caesar used the cipher alphabet in Figure 1.

The message "meet at dawn" would become (after substituting p for m, h for e and so on) "phhw dw gdzq." The substitution process is called encipherment. Similarly, if we go from ciphertext to plaintext, the process is called decipherment. A substitution cipher similar to Caesar's is the type used in the cryptogram puzzles my program helps solve.

A code, on the other hand, involves a large number of words, symbols or numbers that replace plaintext words or phrases. Code requires the use of a codebook, similar to an English-foreign language dictionary. The plaintext word or phrase is looked up in the codebook to find the corresponding code word, phrase or number. My program is not designed to deal with codes.

Cryptogram solving, or deciphering a message when you do not have the key, is largely a trial-and-error process based on letter frequency statistics, which makes the problem ideal for a computer. The computer can determine letter frequencies occurring in a cryptogram, display them for you, and allow you to input and change guesses for letters of the cipher. Analysis requires some knowledge of the normal occurrence of letters in English text (or whatever the native language of the cipher maker). A listing of letter frequencies for English text is given in Table 1.

Plaintext Alphabet	Ciphertext Alphabet
a	d
b	e
c	f
d	g
e	h
f	i
g	j
h	k
i	l
j	m
k	n
l	o
m	p
n	q
o	r
p	s
q	t
r	u
s	v
t	w
u	x
v	y
w	z
x	a
y	b
z	c

Figure 1

Caesar's Cipher, used by Julius Caesar during his military campaigns, is created by "shifting" each letter of the alphabet a fixed number of places.

My cryptogram-solving program, (Program Listing 1), for a Level II TRS-80, requires you to input the number of lines contained in the cryptogram and it requests each line be entered in turn. After a line is entered, its length is determined using LEN(A$(J)). When the entire cryptogram has been input, the program counts character occurence and ranks the characters by frequency. The ranking is displayed so you can compare it to the normal frequency of letters in English text.

Using the frequency distribution as a guide, input your substitutions, entering the cipher symbol first and the text letter second. The ciphertext is then displayed with the appropriate change below each letter for which you have entered a trial. After each display, you may re-examine the frequency distribution, enter another exchange, erase all previous substitutions and begin again, or enter a new cryptogram. You can erase a trial by answering the substitution prompt with the ciphertext letter followed by: ," ".

After each exchange, more and more of the message peeks through, giving you further hints for the next substitution. (This assumes, of course, that your previous guesses were fairly good. If they weren't, the deciphered fragments will look like gobbledygook and it might be a good idea to start over.)

By inputting the number of lines and having the program measure the length of each line, the amount of time used counting the occurrence of each symbol is minimized compared to the time required if a fixed line length is used.

One limitation of the program is the assumption that the cryptogram is based on a simple substitution cipher containing only the 26 letters

of the alphabet. (This is the case with almost all cryptograms.) If the ciphertext uses symbols and/or numbers, the program will have to be refined accordingly.

My sons also acquired an interest in codes and ciphers, so we collaborated on a second program. This one enciphers and deciphers messages given the cipher alphabet. "Orphan Charlie's Decoder Badge Program" allows my sons to prepare secret messages for their friends or read ones they receive (Program Listing 2). As you can see, the program contains many of the features of the cryptogram-solver but introduces a few new wrinkles.

TABLE 1
Letter Frequency in English Text (in percent)

E	13.0	U	2.7
T	9.5	M	2.6
A	8.0	P	2.2
O	7.9	Y	1.9
N	7.2	G	1.8
R	7.0	W	1.6
I	6.7	B	1.3
S	6.1	V	1.0
H	5.2	X	0.4
D	3.9	K	0.3
L	3.5	J	0.3
C	2.9	Q	0.1
F	2.8	Z	0.1

Note: This table is a composite drawn from a number of sources and averaged.

In the second program, any letter, symbol or number on the keyboard can be substituted for the 36 characters (26 letters and 10 digits) expected in the plaintext, allowing you to encipher both alphabetic and numeric information without having to write out the numbers.

The Decoder Badge Program has the provision for using a constant key (cipher alphabet) as contained in a DATA statement or a key input by you. Once the key is determined and entered, you indicate whether a message is to be enciphered or deciphered. If the message is to be enciphered, type in the plaintext line by line, pausing after each line until the encipherment is made and displayed. If the message is to be deciphered, the process is similar; the ciphertext is entered line by line and the deciphered message is displayed.

The second program uses a simple substitution cipher. Encipherment could be more complex by making all ciphertext words the same length (5 characters is the usual case). You could also use two or more keys with alternate letters enciphered with alternate keys.

Once you have used these two programs, you might want to dig a little deeper into cryptography. I suggest you read David Kahn's *The Codebreakers*, a Signet paperback published by The New American Library. □

Sample Run

```
** FREQUENCY OF OCCURRENCE **

S 9             G 6             Y 4             W 4
U 4             R 4             K 4             V 3
T 3             O 3             E 3             Q 2
N 2             C 2             M 1             D 1
A 1             Z 0             X 0             P 0
L 0             J 0             I 0             H 0
F 0             B 0
WHEN REVIEW COMPLETE, PRESS ENTER?


VRS NSSUKGY QN RSEUVR

WEG QGUC OS YEKGSA OC

TKWMGSTT.

Y.W. UKWRVSGOSDY

ENTER SUBSTITUTION (CIPHER LETTER FIRST)? S,E


 VRS NSSUKGY QN RSEUVR
   E  EE         E

 WEG QGUC OS YEKGSA OC
           E     E

 TKWMGSTT.
      E

 Y.W. UKWRVSGOSDY
           E  E

 DO YOU WISH TO SEE THE FREQUENCY DISTRIBUTION
  BEFORE MAKING ANOTHER SUBSTITUTION (Y/N)? N
 DO YOU WISH TO MAKE ANOTHER SUBSTITUTION (Y/N)? Y
 ENTER SUBSTITUTION (CIPHER LETTER FIRST)? V,T


 VRS NSSUKGY QN RSEUVR
 THE FEELING OF HEALTH

 WEG QGUC OS YEKGSA OC
  AN ONL   E GAINE

 TKWMGSTT.
  I  NE

 Y.W. UKWRVSGOSDY
 G    LI HTEN E G

 DO YOU WISH TO SEE THE FREQUENCY DISTRIBUTION
  BEFORE MAKING ANOTHER SUBSTITUTION (Y/N)? N
 DO YOU WISH TO MAKE ANOTHER SUBSTITUTION (Y/N)? Y
 ENTER SUBSTITUTION (CIPHER LETTER FIRST)? T,S


 VRS NSSUKGY QN RSEUVR
 THE FEELING OF HEALTH

 WEG QGUC OS YEKGSA OC
 CAN ONLY BE GAINED BY

 TKWMGSTT.
 SICKNESS

 Y.W. UKWRVSGOSDY
 G C  LICHTENBERG

 DO YOU WISH TO SEE THE FREQUENCY DISTRIBUTION
  BEFORE MAKING ANOTHER SUBSTITUTION (Y/N)?
```

Cryptogram Solver Program Listing 1

```
100 CLEAR 1000
110 DIM A$(10),B$(26),AA$(10,60),KN(26),KT(26),
    LN(10)
120 CLS:INPUT "HOW MANY LINES IN THE CRYPROGRAM"
    :NL
130 FOR J=1 TO NL
140 PRINT "TYPE LINE"; J;" OF CRYPTOGRAM:"
150 INPUT A$(J)
160 LN(J) = LEN(A$(J))
170 NEXT J
180 FOR J=1 TO 26:KN(J) = 0: NEXT J
190 FOR J=1 TO NL
200 FOR K=1 TO LN(J)
210 FOR L=1 TO 26
220 IF MID$(A$(J),K,1)<>CHR$(L+64) GOTO 250
230 KN(L) = KN(L) + 1
240 GOTO 260
250 NEXT L
260 NEXT K
270 NEXT J
280 FOR J=1 TO 26
290 MX = -1
300 FOR K=1 TO 26
310 IF KN(K)<MX GOTO 340
320 KS = K
330 MX = KN(K)
340 NEXT K
350 B$(J) = CHR$(KS+64)
360 KT(J) = MX
370 KN(KS) = -99
380 NEXT J
390 GOSUB 780
400 FOR J=1 TO NL
410 FOR K=1 TO LN(J)
420 AA$(J,K) = " "
430 NEXT K
440 NEXT J
450 CLS:FOR J=1 TO NL
460 PRINT A$(J):PRINT
470 NEXT J
480 INPUT "ENTER SUBSTITUTION (CIPHER LETTER
    FIRST)";X$,Y$
490 FOR J=1 TO NL
500 FOR K=1 TO LN(J)
510 IF MID$(A$(J),K,1)=X$ THEN AA$(J,K) = Y$
520 NEXT K
530 NEXT J
540 CLS:FOR J=1 TO NL
550 PRINT A$(J)
560 FOR K=1 TO LN(J)
570 PRINT AA$(J,K);
580 NEXT K
590 PRINT:PRINT
600 NEXT J
610 PRINT "DO YOU WISH TO SEE THE FREQUENCY
    DISTRIBUTION"
620 INPUT " BEFORE MAKING ANOTHER SUBSTITUTION
    (Y/N)";Z$
630 IF Z$="N" GOTO 670
640 IF Z$<>"Y" GOTO 610
650 GOSUB 780
660 GOTO 480
670 INPUT "DO YOU WISH TO MAKE ANOTHER
    SUBSTITUTION (Y/N)";Z$
680 IF Z$="Y" GOTO 480
690 IF Z$<>"N" GOTO 670
700 PRINT "DO YOU WISH TO ERASE ALL
    SUBSTITUTIONS AND
710 INPUT " BEGIN AGAIN (Y/N)";Z$
720 IF Z$="Y" GOTO 390
730 IF Z$<>"N" GOTO 700
740 INPUT "DO YOU WISH TO SOLVE ANOTHER
    CRYPTOGRAM (Y/N)";Z$
750 IF Z$="Y" GOTO 120
760 IF Z$<>"N" GOTO 740
770 END
```

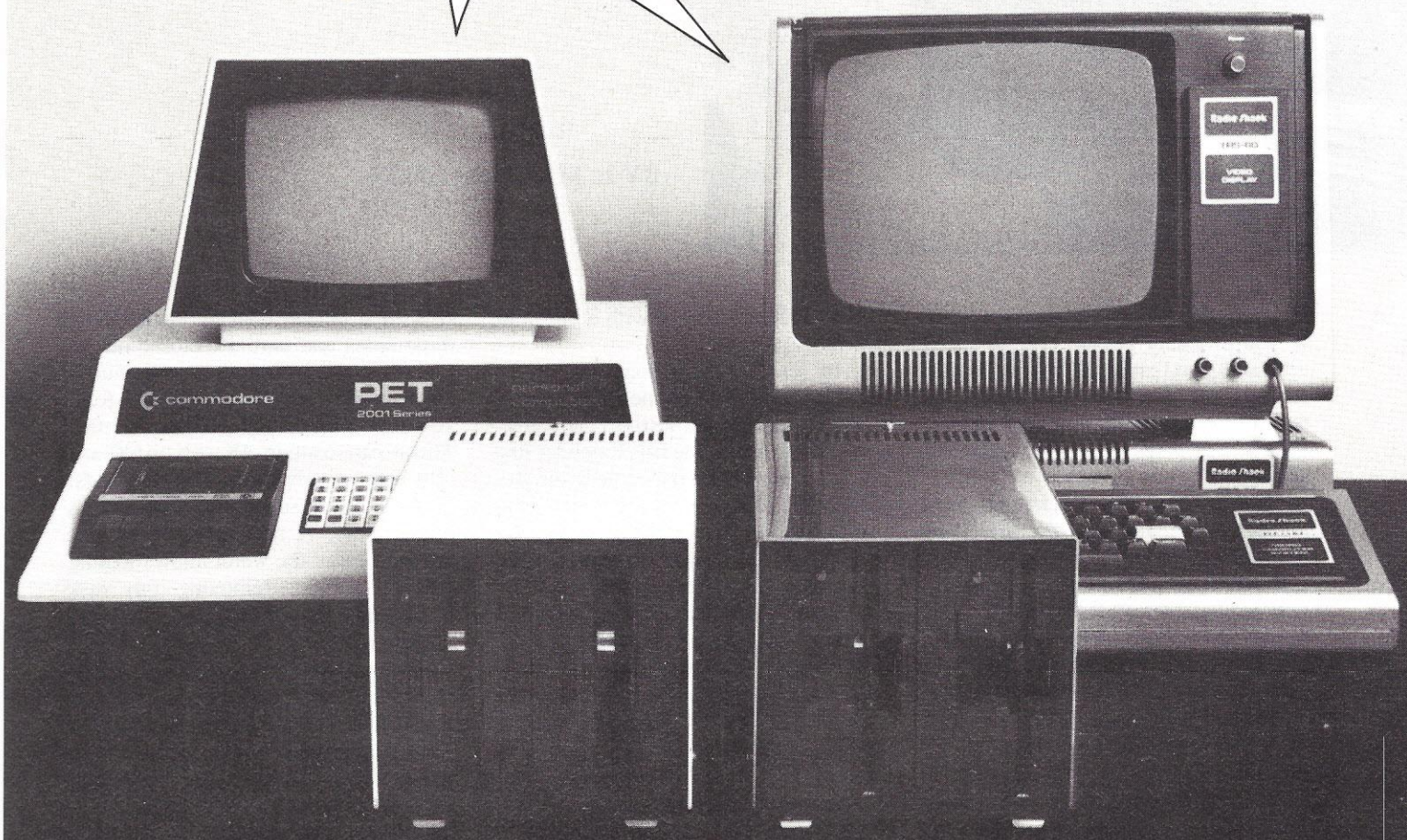
Continued

```
780 CLS:PRINT "** FREQUENCY OF OCCURRENCE **"
790 PRINT:PRINT
800 FOR J=1 TO 26
810 PRINT B$(J);KT(J),
820 NEXT J
830 PRINT:INPUT "WHEN REVIEW COMPLETE, PRESS
    ENTER";Z$
840 RETURN
```

Decoder Badge Program Listing 2

```
100 CLEAR 300
110 DIM D$(60)
120 A$ = "ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890"
130 INPUT "IS NEW KEY TO BE ENTERED (Y/N)";Z$
140 IF Z$="Y" GOTO 180
150 IF Z$<>"N" GOTO 130
160 B$ = "QWERTYUIOPASDFGHJKLZXCVBNM5674380912"
170 GOTO 240
180 INPUT "ENTER NEW KEY";B$
190 L = LEN(B$)
200 IF L=36 GOTO 240
210 PRINT "INSTEAD OF HAVING 36 CHARACTERS,"
220 PRINT "KEY CONTAINS";1;" CHARACTERS."
230 GOTO 180
240 DO YOU WISH TO DECIPHER OR ENCIPHER A
    MESSAGE (D/E)";Z$
250 IF Z$="D" GOTO 510
260 IF Z$<>"E" GOTO 240
270 INPUT "INPUT FIRST LINE OF PLAINTEXT:";C$
280 L = LEN(C$)
290 FOR I=1 TO L
300 X$ = MID$(C$,I,1)
310 IF X$=" " GOTO 370
320 FOR J=1 TO 36
330 IF X$<>MID$(A$,J,1) GOTO 360
340 D$(I) = MID$(B$,J,1)
350 GOTO 380
360 NEXT J
370 D$(I) = " "
380 NEXT I
390 PRINT "  ";
400 FOR I=1 TO L
410 PRINT D$(I);
420 NEXT I
430 PRINT:PRINT
440 INPUT "IS THERE ANOTHER LINE OF PLAINTEXT
    (Y/N)";Z$
450 IF Z$="N" GOTO 490
460 IF Z$<>"Y" GOTO 440
470 INPUT "INPUT NEXT LINE OF PLAINTEXT:";C$
480 GOTO 280
490 PRINT " MESSAGE IS COMPLETELY ENCIPHERED."
500 END
510 INPUT "INPUT FIRST LINE OF CIPHEPTEXT:";C$
520 L = LEN(C$)
530 FOR I=1 TO L
540 X$ = MID$(C$,I,1)
550 IF X$=" " GOTO 610
560 FOR J=1 TO 36
570 IF X$<>MID$(B$,J,1) GOTO 600
580 D$(I) = MID$(A$,J,1)
590 GOTO 620
600 NEXT J
610 D$(I) = " "
620 NEXT I
630 PRINT "  ";
640 FOR I=1 TO L
650 PRINT D$(I);
660 NEXT I
670 PRINT:PRINT
680 INPUT "IS THERE ANOTHER LINE OF CIPHERTEXT
    (Y/N)";Z$
690 IF Z$="N" GOTO 730
700 IF Z$<>"Y" GOTO 680
710 INPUT "INPUT NEXT LINE OF CIPHERTEXT:";C$
720 GOTO 520
730 PRINT "MESSAGE IS COMPLETELY DECIPHERED."
740 END
```

THANKS FOR THE MEMORIES.



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CIRCLE 28

Wafers: An Alternative to Disks

BY L. MITCHELL WEIN

If you own a TRS-80 cassette system you probably get the urge to speed up loading and saving of programs after staring out the window while the recorder hums along — especially if BAD compares require repeated attempts.

Your first possibility is to upgrade to a disk system. Just one disk drive first requires an expansion interface with 16K RAM. The Disk Operating System will require enough RAM to force 32K RAM to be available to the entire system. Since your tape system will start with 16K RAM, you'll need the additional 16K. Radio Shack's catalog shows a price of $448 for an expansion interface with 16K RAM and $499 for Mini-Disk Drive I. This amounts to $947 before sales taxes, for just one disk drive. If you can afford the price, this is probably the best expansion choice since a lot of software is designed for this kind of system — especially if you purchase a second Mini-Disk drive for an additional $499.

However, for you poor souls who just don't have the Big Bucks for this expansion, there is hope. Try wafers. Exatron Corporation manufactures a wafer system called the Stringy Floppy Mass Storage System.

Exatron's starter kit, for $302.50, includes one wafer drive called an Exatron Stringy Floppy, Microsoft's Level III *or* Editor/Assembler-Plus, 20 assorted wafers, a 2-for-1 Bus Extender and an ESF Machine Language Monitor. Additional wafer drives cost $199.50 plus $3 for shipping and handling. Up to seven drives can be operated on one CPU using the proper Bus Extender connected to the card edge at the left rear of the TRS-80 chassis. The Stringy Floppy comes with a one-year warranty.

The female 40-pin connector on the ESF flat cable and on the Bus Extender fit very tight on the TRS-80 card edge. Therefore, attach the Bus Extender first and then attach the flat cable to the Bus Extender. However, if the female connector does not fit on the card, the ESF flat cable itself can be connected to the card edge and the Bus Extender exchanged for additional wafers. If neither cable fits on the card edge (unlikely), you can exchange for a new Bus Extender or send back the unit for a refund. Connect the ESF power pack, which supplies the unit, to a plug containing a switch which can be purchased in any hardware store. Turn off this switch when the unit is not in use.

How about loading speed comparisons? Well, rated baud rates are 250 for Level I cassette, 500 for Level II cassette and 7200 for Level II wafer. Another comparison shows a 13,000 byte program loading in 3-1/2 minutes from Level II cassette, 20 seconds from Level II disk and 24 seconds from a 20-foot wafer. Loading from a 50-foot wafer would take 60 seconds. A 20-foot wafer can hold 16,000 bytes and a 50-foot wafer can hold 40,000 bytes. In contrast, a Mini-Disk loaded in drive 1 can hold 49,900 bytes and loaded in drive 2, 3 or 4 can hold 85,760 bytes. All factors considered, wafers compare well with disks at a fraction of the cost.

The ESF drive, which measures 5-3/4″ by 4-1/4″ by 2-1/2″ and weighs 3.8 ounces, is a rectangular box with two LED lights, an opening for wafer input and no manual controls. The wafer itself measures 1.6 × 2.7 × 0.2″ and weighs 1/3 ounce. The wafer consists of a plastic housing enclosed on three sides and partially closed on the fourth side. Inside is a continuous single reel of tape available in 5-foot, 10-foot, 20-foot and 50-foot lengths. These can contain 4K, 8K, 16K and 40K respectively and load in 6 seconds, 12 seconds, 24 seconds and 60 seconds respectively. A removable silver disk on one side of the wafer allows writing on the wafer. Removing this disk allows reading of the wafer but not writing on it.

The wafer is very delicate; touching the tape on the partially open side can destroy it. You can store the wafers in three-hole plastic sheets made to hold ten business cards. However, no more than five wafers should be stored in each sheet, alternating storage sides in adjacent sheets to avoid damage when storing or removing them.

After connecting your ESF drive to the TRS-80, turn on the intervening switch between the ESF power pack and the socket, then turn on the computer. If you violate this sequence the drive will self-start and not turn off. After the TRS-80 is powered up, turning off the drive will cause a return to the MEMORY? screen and corresponding loss of data and programs in the CPU.

After first turning on the ESF drive and then the TRS-80, press ENTER to the MEMORY? and then ENTER SYSTEM. Type /12345 and the wafer drive will be activated. Enter a new wafer to the drive and type @NEW and then ENTER and the wafer will be certified. Any defects will be spelled out. Return defective wafers to Exatron for exchange. The wafer firmware is located in an unused area of ROM and does not

use more than a nominal area of RAM. Without wafers 15,572 bytes are available in RAM. With wafers 15,568 bytes are available in RAM. The four bytes used are at the top of RAM. Therefore, if any machine language routines are to be stored at the top of RAM, a partition should be entered in answer to the MEMORY? at least one byte below the lower location of the routine to insure against interference with the wafer firmware.

If you're going to use data with any program, load ESF Data I/O 3.2 right after activating the wafer firmware. This will leave RAM with 14,544 bytes.

To save programs, type @SAVEnn where nn represents the file number. Up to 99 files can be saved on one wafer. When programs are saved, they're also verified. To reload a program, type @LOADnn. Wafers can also be partially erased by typing @NEWnn, which will erase file nn and all higher files. If this procedure is followed, file nn-1 should be loaded and then re-saved to re-establish the End-of-File marker since the @NEWnn instruction occasionally disturbs the last EOF marker. Files lower than the highest can also be loaded, changed and re-saved in the same location if the number of bytes remains constant so as not to disturb that file's EOF marker. Machine language routines can also be saved by using the format @SAVE-nn, sssss, lllll, eeeee. The sssss is the starting location, lllll is the length and eeeee is the entry point for auto-start. The entry point for auto-start is optional. Machine language routines are loaded using the simple @LOADnn.

Here are typical program lines to first save and then load data files:

```
1000    @OPEN1
1010    @PRINT A$, B#, C%
1020    @CLOSE1
```

```
2000    @OPEN1
2010    @INPUT A$, B#, C%
2020    @CLOSE1
```

The lines containing data save and load instructions should not contain multiple statements as these could interfere with the action of ESF Data I/O 3.2.

Exatron Corporation has a snappy product as well as an excellent customer service policy. Every call I made to the toll-free number was handled well by the service personnel.

Exatron Corporation, 3555 Ryder St., Santa Clara, CA 95051; (800) 538-8559 (outside California). □

ng.....Scrolling.....Scrolling.....Sc

BY ROGER B. WILCOX

Messages scrolled word by word across TV screens attract our attention because they are dynamic — they move. Since the words are developed one letter at a time, we naturally try to guess what will come next. This all adds up to a type of message display that is a departure from the one that you are accustomed to seeing on your computer CRT, and will add interest and a professional look to your programs.

This type of display might also be useful as a teaching aid for beginning readers because its dynamics (kids like things that move) would hold their interest. Interaction with the program could be provided by allowing the student reader to select the speed that the alphabet or words moved across the screen.

TRS-80 Level II Basic (and others) includes a pair of string-handling commands that let us scroll a message across the CRT screen from right to left. These commands are PRINT LEFT$(string,n) and PRINT RIGHT$ (sting,n). They print the first n and last n characters, respectively, of the designated string.

Messages in the following programs are limited to the length of one line (64 characters for TRS-80). Also, you can't use commas or colons in Program Listing 2. These limitations are not serious however.

In the simple form of the program (Listing 1), line 10 clears string storage for a full-line-length string and line 30 counts the length of the string for later use. Line 50 prints the message as it "emerges" from the right-hand margin. It does this by printing only that part of the message that is between the location of the first letter and the right-hand margin, using X to calculate the number of characters.

The program then jumps to line 80 for a short pause before line 90 erases the line in preparation for the next print command. The value of X is decremented (STEP-1), and this sequence is repeated until the last character of the message reaches the right-hand margin.

At this point lines 50 and 60 are "not true" and line 70 becomes the active print statement in the loop, printing the complete message until the first letter touches the left-hand margin, Line 60 becomes "true" and prints only that part of the message that is to the right of the left-hand margin, using N and X to determine the number of characters. The program jumps to line 80 and the loop repeats until the message "disappears" letter by letter.

The time that the message pauses (line 80) and the number of steps that the message jumps each time (line 40) can be changed independently of each other to suit your personal preferences.

If you clear additional string storage (line 10), you can have several different messages appear in sequence, as in Program Listing 2. Essentially, the first program has been put inside another loop. Line 40 moves the cursor down to the start of an open line so you can see how much of the line you're using as you type your message, and you don't have to count letters and spaces.

The whole sequence will repeat indefinitely if you add GOTO 70 after line 140. I chose to display the message near the center of the screen, but it can be positioned on any other line by changing the starting and ending values of X. (If you use the bottom line, remember to add a semicolon in front of the colon in lines 90 and 100, and at the end of lines 110 and 130.) Aside from using these programs by themselves to amuse and amaze your friends, you could incorporate the first version into a larger program to print out any messages that you want to really stand out. The scrolling message takes time to complete, so don't over use it or you'll get tired of waiting for it to finish and it will loose its interest value. With a little rework, you can use the double-sized letters available on the TRS-80 Level II. You'd need to reduce the message length (in terms of characters) to fit on one line. □

Listing 1

```
10 CLEAR 64
20 A$="INSERT MESSAGE HERE"
30 N=LEN(A$)
40 FOR X=575 TO 512-N STEP-1
50 IF X=>575-N PRINT@ X, LEFT$(A$,
   575-X):GOTO 80
60 IF X=<512 PRINT@ 512, RIGHT$(A$,
   N+X-512):GOTO 80
70 PRINT@ X, A$
80 FOR Y=0 TO 30: NEXT Y
90 PRINT@ 512, CHR$(30)
100 NEXT X
```

Note: PRINT@ is Level II BASIC for PRINT AT

Listing 2

```
10 CLEAR 250
20 FOR L=1 TO 3
30 PRINT "WHAT IS YOUR MESSAGE (LIMIT 64 LETTERS/SPACES)"
40 INPUT A$(L)
50 N=LEN(A$(L)): IF N>64 PRINT "MESSAGE TOO LONG":GOTO 30
60 NEXT L: CLS
70 FOR L=1 TO 3: N=LEN(A$(L))
80 FOR X=575 TO 512-N STEP-1
90 IF X=> 575-N PRINT@ X, LEFT$(A$(L),575-X): GOTO 120
100 IF X=<512 PRINT@ 512, RIGHT$(A$(L),N+X-512): GOTO 120
110 PRINT@ X, A$(L)
120 FOR Y=0 TO 30: NEXT Y
130 PRINT@ 512, CHR$(30)
140 NEXT X,L
```

How to write for Personal Computing

You've written the programs we want to publish. You – the *Personal Computing* readers – are using your computers in businesses, homes, offices and schools. Other readers, just as software-hungry as you, are eager to try out your programs, your applications and your techniques. So why not share what you've done by submitting an article to *PC?*

It's easier than you might think. Remember: we're more interested in practical programs and useful applications than in fancy prose. And our editorial staff stands ready to help with any problems you encounter in writing your article; just give us a call at (617) 232-5470.

Here are some handy guidelines to help you get started.

First, decide what kind of article you want to write. Do you have a *business program* that will help an executive, salesman, doctor, lawyer or shopkeeper function more efficiently? Think about how businesses can benefit from microcomputers – not only in the obvious areas of inventory, accounting and payroll, but in all departments and levels right up to the president's desk. Financial and marketing analysis, time management, planning, material handling, product design and cost accounting are areas ripe for creative programming.

How do you use your computer for *home and personal applications* in your living room, kitchen, study or den? Again, think beyond the obvious areas of checkbook balancing and budgeting (though these areas are far from exhausted) to other applications. Hobbies, home management, household inventory, gardening and landscaping, personal income and expense analysis, personal mailing lists and word processing are just a few ideas to spark your imagination.

What *education programs* have you written for children, adults, professionals, businessmen and teachers? Computers can not only teach children basic subjects such as spelling, math, geography, economics, civics, grammar, literature and science, but can help adults review or sharpen skills in these areas as well. How else can computers function in or out of the classroom to aid learning? To help teachers and administrators?

Are you proficient in some programming technique or special computer area you could explain in a *tutorial article*? How do you save time, money, computer memory or frustration when programming or using your computer? Others can benefit from the same techniques you use.

Computer games, history, humor and *fiction* are other areas rich in article and story ideas.

Your second step is to write the text of the article. Remember, readers aren't familiar with your program. So explain in detail what the program does and how it does it. Include here the overall structure of your program as well as any special algorithms or routines you've used. Give suggestions for modifying or expanding the program for other applications, other businesses or other situations.

Third, prepare your supporting documentation. Include at least a program listing and one or two sample runs, and add program notes to explain any special commands used or other special features of your program. Use charts, diagrams, figures and photos if they help explain your program and its use.

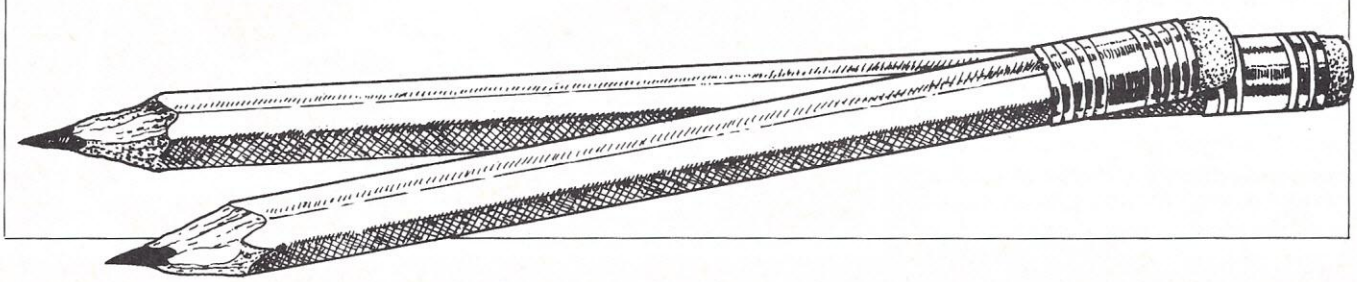
Finally, mail your manuscript. Address it to: Don Wood, Managing Editor, Personal Computing Magazine, 1050 Commonwealth Ave., Boston, MA 02215.

A few suggestions: All submissions should be original, typed (*not* all CAPS), double-spaced and neat. Please include your name and address on the first page of the article and enclose a self-addressed, stamped envelope for return of material.

Since we photograph program listings and sample runs exactly as you send them to us for publication in the magazine, please be sure you use a fresh ribbon for computer printouts. If you don't have a printer, you can type your listings single spaced; but again, be sure you use a new ribbon. (If your program relies heavily on graphics, you can photograph sample runs from your CRT. But take care to avoid distortion due to the curve of the screen.)

Feel free to call us if you have any questions or want to discuss specific ideas. We can give you feedback and suggest appropriate slants and approaches.

We're always looking for fresh, original ideas. While these guidelines will help you in preparing material for *Personal Computing*, don't assume we don't want your idea just because it's not mentioned here. Let us and our readers know what *you're* doing with your computer.



BOOKSHELF

Basic Training for the Compucolor

Basic Training for Compucolor Computers, by Joseph J. Charles, published by Joseph J. Charles, Box 750, Hilton, NY 14468; 1980; 192+viii pp., $14.95.

The owner of a new computer is eager to begin programming, but soon discovers that he or she needs to know almost everything at once. Even the simplest programs involve input and output operations, mass-storage manipulations, keyboard commands, and some numeric or string processing. If the manufacturer's operating manual is organized by subject, the material needed to get started may be scattered throughout several chapters.

This problem in getting started is especially keen with the versatile and complex Compucolor II computer, which has an integral diskette drive, an elaborate file control system, numerous operating modes and escape codes, color display, extensive graphics, Basic in ROM, and both serial (RS-232C) and parallel I/O ports.

Basic Training for Compucolor Computers solves this problem nicely and is just what the beginner needs to supplement the Compucolor II Instruction Manual. Author Joseph Charles very capably guides the user from first power-up to advanced programming concepts. This book assumes no prior knowledge of either Basic or Compucolor capabilities.

Mr. Charles has arranged his material into 97 sections, each of which presents a single concept clearly and thoroughly, illustrated with numerous examples and reproduced program listings. Some sections end with exercises for the reader to try, and although no answers are given, usually none are needed.

The first sections of the book cover such fundamentals as getting familiar with the keyboard, page and scrolling modes, typing a program, color and character size selection, numbers and variables. We are then guided through arithmetic and string operations, line numbering, and all the keywords in Compucolor Basic. Additional sections treat functions, arrrays and string storage requirements.

Much of the power in the Compucolor computer lies in its PLOT statements and graphics, and this book has over fifty pages of clear explanation and well-chosen examples. These sections begin with the fundamentals of color theory and explain how the "null" character can be used to blend the eight primary colors into still more hues.

Have you ever programmed a game with a playing field which occupied only part of the CRT screen, only to become entangled in those three different coordinate systems — PAGE, PLOT and Game? Author Charles thoughtfully provides not only a PAGE MODE/PLOT MODE chart, but all the necessary interconversion equations.

The final sixteen sections cover all aspects of the file control system. My copy of this book arrived while I was writing an extensive disk file program, something I had not done before. I turned to *Basic Training for Compucolor Computers* for help and in a short time I had created my files and had moved data to and from a disk with a clear understanding of what was going on.

Some books on Basic try to be too funny, and the humor gets in the way when the books are later used for reference. Mr. Charles has a delightful sense of humor which he uses with restraint and good taste, and he writes with clarity and flawless English. The pages are large with wide margins, and the typography is uncrowded, allowing for reader annotations. There are occasional errors, such as *five* instead of *four,* and *data* instead of *date* on page 163, and missing brackets in the displayed examples on page 167. Most errors are correctable from context.

Although this book is written for the beginner, the experienced Compucolor computer user will find much that is new and useful. For example, we are given an explanation of the disk directory display columns, a decimal-hex interconversion program, instructions for making a hex-arithmetic slide rule, and tested programs for a household budget and Christmas mailing list. There is no information here on I/O port operations, nor on machine or assembly language programming.

Basic Training for Compucolor Computers is an excellent book and belongs alongside every Compucolor computer within easy reach.

—Reviewed by Wallace R. Rust

Mr. Rust is Technical Associate for Eastman Kodak Co.

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COMPUTER CHESS

HARRY SHERSHOW — Dept. Editor
MORRIS MILLER — Chess Annotater

First OFFICIAL North American Microcomputer Chess Championship

The first "official" microcomputer chess championship is being held at the LeBaron Hotel, San Jose, CA, Sept. 5, 6 and 7! Contributing financial support for this tournament are PERSONAL COMPUTING; APPLIED CONCEPTS (originator and mfr. of BORIS and SARGON units); the MYCHESS Programming team; and MOTOROLA (mfr. of the 6800-series chips.) Tournament director will be Bryce Perry, Vice President for the Pacific Region of the US Chess Federation. Tournament coordinator is George Koltanowski, chess editor with the San Francisco Chronicle, nationally syndicated chess columnist and former president of the US Chess Federation.

The LeBaron Hotel, host for the tournament, is a beautiful hotel in San Jose. It features 320 comfortable rooms with waterbeds, king and queen size. It is well known in California for its fine food and two excellent restaurants and exciting entertainment. In addition, spectacular lounge shows are held at the "Top-O-The-Baron" and evening dancing is available at the Back Door Disco. The hotel itself sits in lovely San Jose which is near many well-known restaurants, shopping centers, tourist attractions and 32 different wineries (many of them offering **free** wine tasting sessions at the plant.) Within short distance of this delightful town are San Francisco, Carmel and Monterey, beaches, redwood forests, Santa Cruz Boardwalk, Center for Performing Arts, Frontier Village, Winchester Mystery House, Great America Exhibition, Bay Meadows Racetrack, Rosicrucian Egyptian Museum and many other attractions tempting the tourist. September is a delightful time of the year to visit beautiful San Jose, so if you listen to the local travel agents, and the San Jose Chamber of Commerce, you'll come along and participate in the first official North American microcomputer chess tournament in one of the most beautiful areas of California.

The tournament itself, organized by International Chess Great George Koltanowski, is being planned as a colorful, exciting event. Three or four well-known International and National Chess Champions will be participating and conducting demonstrations, lectures and exhibitions. They will play games against both computers and spectators and will analyze and lecture on the rapidly expanding field of microcomputer chess. Separate, free exhibition space is being made available for manufacturers to show their computer games (of strategy and logic), to sell their products, and to "put their chips on the table." Microcomputer chess tournaments have always been, basically, a competition among the different chips used in the micros. Semiconductor manufacturers will now have a chance to show, demonstrate and give sales pitches on the merits of their chips while the chips themselves will be engaged in "battling each other" at the tournament tables. Panel discussions are being planned involving the people who make the chips and the people who use them. With the unbelievable, exploding market in electronic games expected to be presaged at the June, Chicago Consumer Electronic Show, the chip manufacturers are glancing expectantly in that direction. Some knowledgeable people are already predicting that 1980 will be the biggest year in microprocessor-controlled products in history. So, some old chips with new features, or some new chips from old firms, may be showing up at the September Microcomputer Chess Tournament. If you want to see which way chess is going, come to San Jose Sept 5, 6 and 7!

Anyone interested in participating in this tournament should write to George Koltanowski, 1200 Gough St., Apt. D-3, San Francisco, CA 94109.

Third World-Championship in Austria

Because of difficulty (and expense) in getting to Australia and Japan (sites of the annual World IFIPS conference) the ICCA is holding its World Computer Chess Tournament Sept 26-29 in Linz, Austria. Plans for this tournament are reported to be almost complete (99% sure, said one spokesman). To date, applications from teams have been approved for this World Tournament. The participants include 7 from the US; 2 from Canada; 5 or 6 from Europe and 1 from Russia. Any program wishing to participate in this World tournament can still apply for admittance by writing to either Prof. Monroe Newborn, School of Computer Science, McGill University, Montreal, Quebec H3A 2K6 or Prof. Benjamin Mittman, Northwestern University, Vogelback Computer Center, 2129 Sheridan Rd., Evanston, IL 60201.

The games business

Ever wonder how "game" rooms are doing? Basically, they are business "parlors" specializing in selling games of all sorts. Their offerings include analog products, digital devices and plain ol' ordinary manual gadgets where you spin a wheel or take a chance. One such outfit is "The Game Room" chain, doing business at three different locations in New Jersey. We talked to co-owner Wayne Masters, (his partner is John Jones) and asked him if there was a coincidence in his proximity to Atlantic City's money-guzzling gambling casinos, only 50 miles away.

"Well," said Wayne, a little anger in his voice, "we were here first! Anyway, our activity has no real fascination for hot-blooded gamblers who rush to New Jersey's casinos in huge numbers. They contribute $20 or $30 million net profit a year to each of the casinos. The places are like huge vacuum cleaners that specialize in cleaning out pockets. People who come to our game rooms, on the other hand, are looking only for pleasant relaxation; not a way to make an easy buck.

"Our game rooms mean just what they say — rooms where you can play games. We have things like Boris, Boris Diplomat, Chess Challenger, Sargon Modular, Gammon Master, and so forth — all on constant display. Customers are encouraged to come in and test these various devices at their leisure and to see how they operate. If they like them, we are hopeful that they will buy one or two. We have found that by putting these products up front on permanent display and letting people have easy access to them, our sales have been boosted immensely.

"We also carry the Atari home video computer system which features cartridges of chess and backgammon, along with 30 other games from their library. Atari, in fact, is our best selling electronic game device. Our real money maker, of course, is our line of pool tables. Some of the popular Atari games are Baseball, Football, Basketball, Space Alert, Armor Battle, Submarine, Soccer and Electronic Mastermind. Our customers can try any of them out before buying and no one is obligated or pressured into buying anything they've been playing with. We let them decide for themselves whether or not to buy."

Wayne has been in this specialized business for the past three years, which is about how long this activity has been in existence. In fact, this business is so new that the nation's owners have not yet had a chance to form themselves into an organization nor publish their own magazine.

The Game Room charges nothing for sampling any of its devices. Customers wander in at the rate of about 400 a day and on the average stay two or three hours trying one game after another. Wayne says some people drop in every day on a regular basis. He estimates that more than 50% of the free players wind up as buyers. The other 50% may return later to make a purchase. Once a customer has tried a game and found it fascinating for him, he will eventually buy it, concludes President Masters.

"Some customers have become gaming addicts — a new national affliction. They come in every day during lunch hour to play the games. Some even bring sandwiches to munch on. We had one guy that got so involved, once, that he sat at a table for more than six hours, playing one game after another — non-stop. That six hour stint is, I think, the world's record for endurance at establishments like ours. Incidentally, I would say that the average customer has a hard time beating either Sargon or Chess Challenger. That doesn't come as a big surprise to me because the **average** chess-playing level in this country is only around 1200. Both Chess Challenger and Sargon play above that level. So if anyone is wondering which unit to buy and if they are average chess players, it becomes a personal choice. Do you want to get beaten by Sargon or would you rather resign to Chess Challenger? It's an echo of human chess. Does it really matter whether you play Korchnoi or Karpov? Both of them are going to beat you. So, really it doesn't matter. You might prefer to get beaten by Korchnoi because you feel he has a better personality. But just as many people prefer to get beaten by Karpov. Actually, to judge this on a purely pragmatic basis, a whipping is painful no matter who holds the whip.

"Players who come here range in ages from their late 60's to kids around 10 years old. Shoppers enjoy the sessions so much that many of them return time after time — even if they have already made a purchase — to try their luck at another game."

Wayne's three "game parlors" are all in New Jersey — at Fairfield (Beehive Plaza); Woodbridge (Woodbridge Shopping Center); and in Neptune (Sea View Square Mall). The company's telephone number is (201) 922-3300. So, give Wayne a buzz and ask him about some of the new electronic gadgets arriving daily at his establishments. Better yet, drop in and play a free game.

ICCA Headquarters Shift

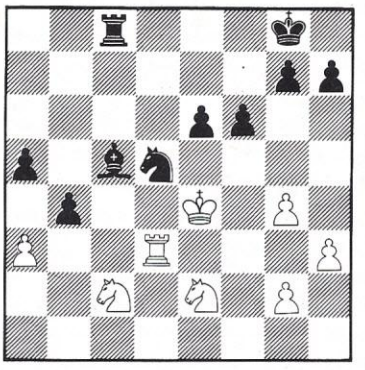
The Headquarters for the International Computer Chess Association (ICCA) has been transferred from Northwestern University to Bell Telephone Laboratories. In order to handle the growing membership more effectively, Ken Thompson of Bell Labs has agreed to handle membership activities. Ben Mittman of Northwestern University continues as the ICCA *Newsletter* Editor. All inquiries and membership application should be sent to: ICCA c/o Ken Thompson, Room 2C423, Bell Telephone Labs, Murray Hill, NJ 07974 USA. Membership dues for 1979-80 are $10.00. Back issues of the ICCA Newsletter are available for an additional $2.00 for a set of three. Editorial material for the Newsletter should be sent to: B. Mittman, Editor, ICCA Newsletter, Vogelback Computing Center, Northwestern University, Evanston, Illinois 60201 USA.

MYCHESS goes to college

On Jan. 15, 1980 a chess tournament was held at the University of California at Berkeley. John Urwin, loaded down with his Cromemco portable hardware, and a MYCHESS disk in his attache case, appeared at the tournament site and showed his USCF membership card. He was allowed to participate as an official entrant and was placed in Class III ("C") in the four-round Swiss. Time control was set at 45 moves in two hours, then 11 moves in 30 minutes. Out of its four games against rated human chess players, MYCHESS won two games, drew one and had only one loss for a total of 2 1/2 points. In the fourth round, one player, David Korb, who had been glaring at the computer for the previous three rounds, and building up an inner hostility, insisted with tournament director Alan Benson, that he be paired against the upstart computer program. Korb, with an official rating of 1242, was becoming increasingly irritated at the machine and was determined to give the device a sound thrashing. Following is the fight that ensued:

KORB White	MYCHESS Black
1. d4	d5
2. Nf3	Nf6
3. Bd2	c6
4. c4	d:c4
5. Nc3	Be6

6. e4 Nbd7; 7. Be2 Qb6 8. 0-0 Bg4 9. Na4 Qb5 10. Qc2 Be6 11. b3 c:b3 12. B:b 5 b:c2 13. Bd3 Bg4 14. Nel N:e4 15. f3 N:d2 16. f:g4 N:fl 17. K:fl e6 18. N:c2 b5 19. Nc3 Nf6 20. h3 b4 21. Ne2 Nd5 22. Kel Bd6 23. Kd2 f6 24. Rb1 0-0 25. Rb3 Rad8 26. Bc4 c5 27. Kd3 c:d4 28. Nc:d4 Rfe8 29. Bb5 a6 30. B:e8 R:e8 31. Ke4 Bc5 32. Nc2 Rd8 33. Rd3 Rc8 34. a3 a5



MYCHESS forces White to quit.

End Problem: *(see diagram):*

35.Rb3	a4

(Korb offers a draw and MYCHESS declines.)

36.Rd3	b3
37.Nd4	B:d4
38.K:d4	Rc2

39. (Resigns as he cannot prevent Black's queening.)

Hit Song of the 80's: "Time on My Hands!"

A new product review
BY EVAN KATZ

Use of a clock in a chess game has always been a necessity, without much fun or frill. When speed chess became popular, the chess clock made it possible to conclude a game in only 10 or 15 minutes. Now, as we enter the 1980's, Micro General offers to the chess world the first computerized, digital chess clock! Although the $200 price tag is steep, I think that the reader will find its value to be quite good. Considering that the Heuer *manual* clock sells for about $100, the Micromate 180 should be a serious consideration for the avid chess player.

Micromate offers the user five modes of play plus many other features simply impossible to imitate on standard clocks. This modern device is beautifully suited to tournament competition. By pressing a few buttons, the user tells the machine the primary and secondary time controls. These may be anything up to 1000 minutes per side and 99 moves per time control allowing complete flexibility. Micromate *automatically* goes into the next time control, adjusting the times and moves to go, after each time constriction is passed (a patented feature!).

As in any mode, Micromate can be set to suppress the display of the seconds until a specific amount of time remains, say two minutes. In case of *human* error, the clock is flexible and will allow adjustment of the moves to go. Micromate also keeps track of time consumed for the previous move and can reset itself to its status before an illegal move made on the last turn. The time remaining, however can *not* be altered by possibly unscrupulous humans. Two button presses instantly reset Micromate for another game without having to rekey the parameters again.

If one player uses all his time, (and who has not been bitten by the bug of time pressure) Micromate will "lock" until reset for another game. One press of a button and the clock will begin sounding a two second "death-march" beep as one player runs out of time. For non-rated competition, the beep may be used as a warning when either player begins to run low on time. Although illegal in U.S.C.F. competition, this can prove to be a good friend to all those who occasionally doze off into "grandmaster" analysis.

Micromate may be halted anytime during a contest, allowing for various necessary departures to the kitchen, etc. The clock has a handy display key which will show the two time controls before or during the contest. For long departures from the chess board, Micromate can turn the display off temporarily, saving battery power while keeping all information stored. For its final trick, Micromate is easily programmed to accept different time allotments for the contestants. This can give junior a shot at dad . . .or dad a crack at junior as the case may be!

Rapid transit mode is used for now popular five- or ten-minute games, where both players have an allotted

time period for the entire battle, regardless of the number of moves. Used in conjunction with a warning buzzer and considering Micromate's seconds accuracy display, speed chess has never been so much fun. Newcomers to Micromate will be amazed that they've been playing speed chess for so long, never knowing *exactly* how much time was left.

Blitz mode has to be the most enjoyable aspect of Micromate. Impossible without a third party in the past, the clock allows the players to play at a certain rate of play *per move*! This nice feature is the perfect balance between the panic of speed chess and the slow tempo of time-control chess. Micromate has created an interesting "new" game: "ten-second-per-move chess." Monitored by the computer, each player has seven seconds to make his move, a "beep" reminder is sounded, and then three more seconds to execute the move and quickly press his button. The result is a stimulating contest with no break for the combatants, who are constantly at each other's throats over the board while battling time itself!

As a bonus of sorts, Micromate will even act as a stopwatch for the timing of just about anything. Counting either up or down, with or without a warning buzz, Micromate is accurate to 1/10 of a second in these two modes.

Sound complicated? Well, Micromate is really easy to operate and learning all about the machine is truly quite easy. A gorgeous learner's manual, with diagrams and examples, accompanies your new friend and each key on the back is labeled and color coded by its purpose. All buttons click nicely and the L.E.D.'s are easily read except in the most uncommon and glary conditions. The display is also tagged with "minutes," "sec," and "moves" above the proper lights. After countless hours of testing, Micromate still functions perfectly and the large, raised, move completion buttons on top still maintain their sharp click.

A hit at any chess gathering, Micromate 180 Digital Chess Clock is a delightful, flexible tool for the avid chess player. Its features and modes expand the dimensions of chess. Look into Micromate — a timely move which you won't want to take back with "ja doub!"

Micromate is available from Micro General Corp., P.O. Box 17746, Irvine, CA 92714.

Battle for Survival

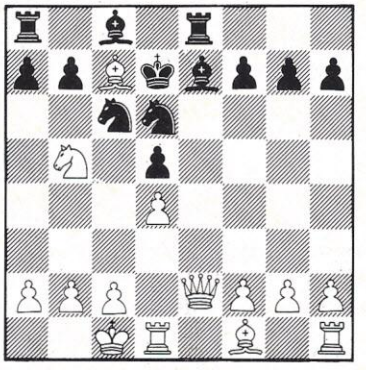
During London's 1979 PCW Chess Tournament (won by Sargon 3.0), two of the least successful entrants faced each other for what some chess snobs called bottom-of-the-barrel prizes. MAX was written by Guy Burkill, 27A Devonshire Close, London W1N, 1LG, England and ran on an APPLE II. MAX's opponent, WIZARD, was programmed by Jeffrey Cooper of Glen View, Burnely Road, Causeway Head, Halifax, West Yorkshire, England. WIZARD was written on a home-brew 8080A system. John Urwin, reporting on the events of that tournament, wrote: "There is not much to say about WIZARD other than it lost all its games and was not much of a challenge to anyone. I am sure Jeff will be making some improvements to the program, unless he has become too overwhelmed by his losses and will want to give it up altogether." Wizard finished dead last in a field of nine. Morris Miller took a peek at this game between two computerized "dummies" — as some of the spectators were heard to mutter, — and came up with some observations.

MAX White	WIZARD Black
1. e4	e5
2. Nf3	Nf6
3. N:e5	N:e4(A)
4. Qe2	Nd6
5. Nc6+	Be7

6. N:d8 K:d8; 7. d4 Re8(B); 8. Nc3 Nc6; 9. Nb5(C) Nf5; 10. Bf4(D) d5; 11. B:c7+ Kd7; 12. 0-0-0(E) Nd6;

The End *(see diagram):*

13. Qg4+	f5
14. Q:g7	Ne4
15. Q:h7	Ng4
16. Q:f5+	Ne6
17. Q:d5+	Bd6
18. Q:d6++	



White to move and mate in five moves, (MAX did it.)

(Told you Max could do it!)

MAX vs WIZARD by Morris Miller

A) The programmers slipped. In this, the Petroff Defense, the necesary response is first 3 . . .d6. The text loses at least a pawn: 4. Qe2 Qe7, 5. Q:e4 d6, 6. d4 f6, 7. f4, etc.

B) Now 8. Be3 is called for to stop all swindles on the open king file.

C) Matching blunder for blunder. Both programs are unaware of: 9 . . .Nb5! 10. Q:b5, Bb4 double check; 11. Kd1 Re1 mate.

D) Now Wizard could at least get the queen back for a rook by Bb4+ followed by rook takes queen. Instead, comes another blunder.

E) And now 12 . . .Bg5+; 13. f4 R:e2; 14. B:e2 a6! 15. P:g5, P:b5. And now: 16. Be5, f6 winning the bishop. Or 16. Bb6, Ke6; 17. Bc5 b6, again trapping the bishop.

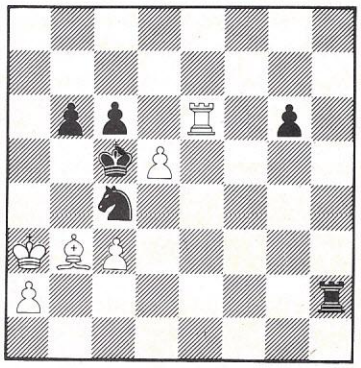
A comedy of errors in which the readers can supply their own question marks, exclamation points, asterisks and stars.

A Southern Blitz

Robert Hyatt of the University of Mississippi's BLITZ 6.0 program, is sharpening his algorithm in preparation for October's battle at the 11th ACM Tournament in Nashville. The following game was played in the Mississippi open tournament, late last year, and was the only game that BLITZ 6.0 lost during that match. It won its five other games, all against human opponents and all with respectable USCF ratings. As noted in the annotations, BLITZ had a draw in its grasp which it overlooked. Also, this was the first time BLITZ 6.0 had played an opponent rated so much higher than itself. BLITZ, says Bob Hyatt, played very passively trying to repeat a position to get a draw. As a result it threw away a good opening advantage and a possible win. Then, adds Prof. Hyatt, BLITZ overlooked the draw because it lacked one ply on the search depth at that particular move. Based on this sharp performance against a 1958-rated player, BLITZ 6.0 will be a serious threat in Nashville, to the current computer-chess titleholder (CHESS 4.7).

HUMAN (1958 Rating) White	BLITZ 6.0 Black
1. e4	e5
2. f4	e:f4
3. Nf3	d5(A)
4. e:d5	Nf6
5. Bb5+?	Bd7?(B)

6. Bc4 Qe7+ 7. Qe2 Q:e2+ 8. K:e2 Bd6 9. Nc3 0-0 10. Re1 Re8+ 11. Kf1 R:e1+ 12. K:e1 Bg4(c) 13. d4 Nbd7 14. Bd2 B:f3 15. g:f3 Nb6 16. Bb3 Re8+ 17. Kf2 Bb4 (D) 18. B:f4 B:c3 19. b:c3 Nb:d5 20. Bd2 Kf8 21. Rb1 Nb6(E) 22. c4 Nbd7 23. Bf4 c6 24. Ba4? (F) Nb6 25. Bb3 Nbd7 26. c3 g6? (G) 27. Bc2 b6 28. Ba4 Rc8 29. Bd6+ Ke8 30. Re1+ Kd8 31. Be7+ Kc7 32. B:f6 N:f6 33. Re7+ Kd6 34. R:f7 Ke6 35. R:a7 Kd6 36. Rb7 Nd7 37. Ra7 Nf6 38. Bb3 Rf8 39. Ke2 Re8+ 40. Kd2 Nd7 41. d5 Ne5 42. R:h7 N:f3+ 43. Kc1 Re1+ 44. Kb2 Re2+ 45. Ka3 R:h2 46. Rf7 Ne5 47. Rf6+ Kc5 48. Re6 N:c4+



Can you play as well as the computer? (White's move.)

The end *(see diagram)*

49. B:c4	K:c4
50. d:c6	Rh3(H)
51. c7	Rh8
52. Rc6+	Kd4
53. c8=Q	R:c8
54. R:c8	g5
55. White wins	

Notations by Morris Miller

A) I prefer 3- . . . N-KB3; 4-N-B3, P-Q4. If at any time white plays P-K5, black answers N-R4. While it is not good play usually to place a knight at the side of the board, black's knight and pawn restrain the white king's side.

B) Blitz justifies white's poor play. Instead 5- . . . P-B3; 6-PxP, NxP. The point is black should play a gambit and hope to gain positional compensation.
After the text white could play 6-BxBch, QxB; 7-P-B4, P-B3; 8-PxP, NxP; 9-P-Q4 with a clear edge.

C) Finally an admission that its fifth move was not good.

D) It is difficult to make progress, especially in view of the threat implicit in white's game: 18-N-K2, N(N3)xP; 19-P-B4, N-K6; 20-P-B5, B-B1; 21-NxP, with great advantage.

E) This ties the knight down. Instead P-QN3.

F) Here white misses 24-P-B5. This would at least force the undoubling of white's pawns, his only weakness.

G) Opening up lines — for the white bishops.

H) An amusing draw is: 50- . . . R-R1; 51-P-B7, R-QB1; 52-R-K7, KxP; 53-K-R4, K-B5 since black threatens mate and white can vary only by giving up the advanced pawn.

Blitz needs improvement on long range planning and end game theory. Blitz gave up the two bishops, being left with two knights against two bishops. Unless there is some other compensation, it has been known for a very long time that this leads to a loss. Yet a rather impressive game by Blitz and when the program is sharpened, Blitz will be a real threat.

On to Nashville

The Eleventh ACM's North American Computer Chess Championship will be held during the 1980 ACM annual meeting. The four round Swiss style tournament (with participants restricted to computers) will take place October 26-28 at the Opryland Hotel Nashville, TN. Two rounds will be played on Sunday October 26 (1 pm and 7:30 pm), one on Monday October 27th (7:30 pm) and the last round on Tuesday October 28th (7:30 pm). The best chess programs in North America are expected to participate and an exciting tournament is anticipated. The Tournament Organizing Committee includes Robert Hyatt, University of Southern Mississippi; Monroe Newborn, McGill University; and Ben Mittman, Northwestern University. David Levy, International Chess Master, is Tournament Director. Individuals interested in participating with their programs should write to Prof. M.M. Newborn, School of Computer Science, McGill University, Montreal, Quebec H3A 2K6, Canada. A maximum of twelve teams will participate. Deadline for entries is September 8, 1980.

Competing programs will be selected by the Tournament Entries Committee (M. Newborn, B. Mittman,

and D. Levy). They will accept the twelve programs which, in their opinion, are the strongest. They will place on "standby" as many as three others. Standbys will be ordered by their apparent strength. If one or more of the originally accepted teams withdraws, the standbys will be called. The strongest standby will be called first; the second next; and the third last. Efforts will be made to confine the tournament to twelve programs.

An entry will be refused if a member of the team will not be present at the tournament. Participants are responsible for all computer arrangements and costs. Cost of communicating to remote computers during the tournament will be covered by the ACM.

Strength of a program will be determined by information on the entry form. Entrants which have not participated in previous ACM tournaments or other major tournaments must provide clear evidence of the program's level of play. Two sample games are required, preferably under tournament conditions. Move timing information should be indicated as well as the level of the opposition.

Tournament Rules for the 11th ACM computer chess championship:

1. The tournament will be four round Swiss style with trophies to winner and runner-up.

2. First and second rounds will be played Sunday, October 26th at 1 pm and 7:30 pm. Third round is scheduled for Monday, October 27th at 7:30 pm and the fourth round on Tuesday, October 28th, at 7:30 pm.

3. Unless otherwise specified, rules of play are identical to those of regular "human" tournament play. If a point is in question, tournament director has authority to make a final decision.

4. Games are played at a speed of 40 moves per player in the first two hours; thereafter, 10 moves every 30 minutes.

5. Tournament director has the right to adjudicate a game after 4-1/2 hours of total elapsed time.

6. Order of finish of the participants will be determined by the total number of points earned. If two teams have an equal number of points, the sum of opponents' points will be used as a second factor. If a tie still remains, the opponents' points will be used as a third factor.

7. If a team encounters technical difficulties (machine failure, communications failure or error, or program failure) during the course of a game, the tournament director may stop the clock as long as necessary, but not to exceed 20 minutes, in order to restore the system. At the end of 20 minutes (or sooner) the clock will be started again. The tournament director may permit a team to stop its clock a maximum of two times during the course of a game.

8. No manual adjustment of program parameters permitted during course of a game. In case of failures, program parameters must be reset to their original settings if possible. Information regarding castling status, en passent status, etc., may be typed in after a failure. At any time during the course of a game, the computer may ask for time remaining on either his or his opponent's clock. This information will be provided. However, the computer must initiate the request for information.

9. At the end of every game, team is required to turn in a listing to the tournament director.

10. Participants are required to attend a meeting at 12 noon on Sunday, October 26, for the purpose of making any last minute rule changes.

11. Participating programs must be the work of the individual submitting the entry. No individual can submit two programs.

12. Each entry is a *program*. A listing of the program should be available on demand to the tournament director. A program can be run on any computing system.

13. Each game is officially played on chess boards provided by the Tournament Organizing Committee. An electronic chess board may be substituted if the opponent is agreeable. The official clock is provided by the TOC. If both sides are agreeable, another clock may be used.

Small Talk with Big Stick

The following item came to us from The Software Association, PO Box 58365, Houston, TX 77058:

"Our Z-CHESS is one of the fastest, most versatile chess opponents available for your TRS-80! With its seven levels of play (up to six levels of look ahead!) and its ability to accept and play all standard chess moves (including castling and en passant captures!), it is truly a challenge for both beginning and advanced players. Alpha-beta pruning and move sorting keep response times to a minimum — in fact, in the Blitz mode, a full 3 ply search, moves average only 10 seconds! A full 4 ply search averages less than 50 seconds! A board setup mode is provided (great for recalling moves), and the computer can play either white or black. Numbered squares simplify move input, which makes Z-CHESS a great way to teach beginners to play. Of course, Z-CHESS will solve mate-in-two problems, and it will solve them *fast!*."

Any readers making personal contact with this brute are invited to send us an account of their experience.

Chip Shot (or, "another human bites the dust")

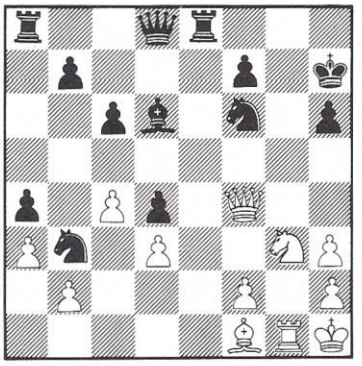
Earlier this year, the Monterey Chess Club of California ran a USCF sanctioned tournament. MYCHESS, an official card-holding member of USCF, competed against humans in that tournament and wound up with 1-1/2 points out of a possible 3. One game was against a player named Verela. Two years ago, Verela was rated 1900. He now has slipped to a 1490 rating. The game they played:

	VERELA White-	MYCHESS Black-
1.	c4	e5
2.	Nc3	Mf6
3.	Nf3	e4
4.	Ng5	d5
5.	d3	h6

6. Nh3 B:h3 7. g:h3 c6 8. Bd2 e:d3 9. e:d3 d4 10. Ne2 Na6 11. a3 Be7 12. Bg2 0-0 13. 0-0 Nc5 14. Qc2 a5 15. Kh1 Re8 16. Rg1 a4 17. Bf1 Nb3 18. B:h6 Kh7 19. Ng3 N:a1 20. Qd2 Nb3 21. Qg5 g:h6 22. Qf4 Bd6

The End *(see diagram)*

23.	Qf5+	Kh8
24.	Ne4	N:e4
25.	d:e4	Qe7
26.	Bd3	Qe6
27.	Qh5	Nc8
28.	Resigns	



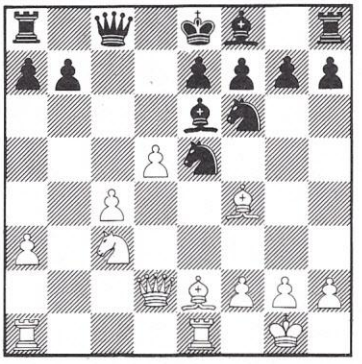
It's curtains for Verella!

MYCHESS causes White's resignation in five moves. Can you do it?

West Coast Computer Championship

BY GEORGE KOLTANOWSKI

Six computer were signed up, but only five turned up, Friday March 14, at Brooks Hall in San Francisco. At the last minute I had been asked to direct this event, and the difference between conducting a regular "human" (as the Computers call us) tournament and a computer tournament is great. Most machines are geared to 40 moves in two hours of play (regular rule) but time limitations here, with two rounds a day, forced a speedier time limit. It was 40 moves in 1-1/2 hours. They were allowed to change the level of play — just once in each game, or whenever the time schedule was changed. This caused some problems. Also, another problem popped up when the two Atari entries, in the third round, failed to meet the right opponents. They had switched boards! Final result, programs and players: 1.) Mychess by John Urwin, San Jose, 3-1/2 ponts out of 4. 2.) Atari 4K by Craig Asher, Sunnyvale, 2-1/2 points. 3, tie.) Sargon by Dan Neumayer, San Ramon and Atari 6K by Larry Wagner, Hayward, 1-1/2 points each and 5.) Voice Challenger by Jim Walker, San Jose 1. (The sixth entry lost its way.)



MYCHESS (White) moves and mates in five. Can you? No peeking please.

	MYCHESS White	VOICE CHALLENGER Black
1.	e4	c6
2.	c4	Qa5
3.	Nf3	Nf6
4.	Nc3	d6
5.	Be2	Bd7

6. d3 Na6 7. 0-0 Rg8 8. Be3 Qb4 9. a3 Qa5 10. b4 Qd8 11. Qd2 Qc8 12. Rfe1 Rh8 13. e5 d:e 14. N:e5 Be6 15. d4 Qc7 16. b5 Nb8 17. Bf4 Qc8 18. b:c6 N:c6 19. d5 N:e5

The End *(see diagram)*

20.	B:e5	Nd7
21.	d:e6	N:e5
22.	B:h5	Qc5
23.	B:f7+	N:f7
24.	Qd7++	

USCF Accepts computers

As of the first of this year, the United States Chess Federation has authorized all microcomputer programs to play in rated tournaments. So far, these "participating juniors" as they are called, have been doing fairly well in class C tournaments (about 60%). *Personal Computing* will periodically report on the programs' performances and (hopefully) increase in ratings.

Straight records

Recently, we received a note from David Champernowne, 25 Worts Causeway, Cambridge CBI 4RJ, England, setting our record straight. In the Jan, '80 *PC*, we said:

"Dr. Good has an impressive background. His most interesting post (to readers of spy thrillers) was his work during World War II at Bletchley on ULTRA. (David Champernowne also worked on the same project.)"

Some of the facts are wrong in that statement. Champernowne writes: "You must have meant somebody else since I did not work on ULTRA nor did I work at Bletchley at any time.

"I have records of several games I've played against BORIS DIPLOMAT. The device gives me a good game if it has seven minutes or more for each move, but it only wins if I make a blunder, which is not rare. I hope to send along to you some interesting games played with BORIS (90 seconds per more) against Apple at Level 4 and BORIS won rather easily in 33 moves. I have just received some advertising information on SARGON III and it looks very interesting."

Programs that find "5-in-a-row"

Gomoku on a Small Computer Part II

By EDWARD S. JOHNSON and ARTHUR COSTON

The first of this two part series discussed the logic of GOMOKU; strategies of moves; weighting factors, and search and pruning techniques. This concluding part discusses suggestions for a better-playing plan and also explores in detail an actual game our program has played.

Following are some ideas we have tried in the past and a few which we know others have tried:

A. It may be wise to separate offense from defense by keeping two separate boards with their own weights. Then you can select a move by combining weights from the two boards in some fashion. In fact, the relative importance given to offense vs. defense can vary during the game.

B. We have implemented a "panic" mode. When our lookahead tells us we are in trouble we broaden our search, trying to find a way out. To this end we may "turn up" the offense and play forcing moves that our opponent has to answer. Sometimes panic mode can find a way out of a seemingly hopeless situation.

C. Some players follow the maxim "well begun is half done" by storing a number of opening combinations that are either known offenses or known defenses against certain patterns of stones. We'd like to do this too if we could only find the time to do it.

D. As we do lookahead we keep an index (from −100 or doom to +100 or rapture) that tells the executive routine how the game is going. This can be used to adjust the offense/defense ratio or to send the program into panic mode.

E. Another thing that could be done is to attempt to anticipate the opponent's next move. This could be done by comparing what the opponent actually plays with a set of more-or-less expected moves. If there is a failure to anticipate the opponent's move then either the opponent has blundered or else he has made a move of such exquisite subtlety that the program fails to appreciate its beauty. In either case it might prove wise to temporarily broaden the search. If the opponent has blundered you certainly want to find a way to grab the advantage. On the other hand, if the opponent has really made a brilliant move, you need to discover where the danger lies.

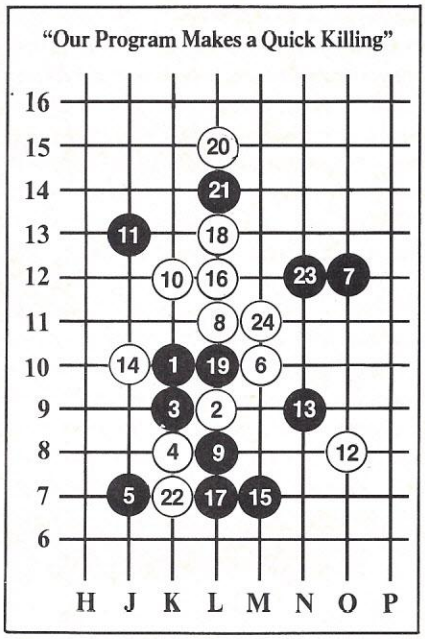
News on "Intelligent" Games of Backgammon, Checkers, Gomoku, Go, etc., welcomed by this department. Computer Chess and Computer Bridge appears separately. Address all correspondence to Computer Games Dept., Personal Computing.

A Tournament Game

This is a game we won in the 1977 competition playing second (white). Although it demonstrates our opponent's shortcomings more than our own brilliance, it does illustrate some interesting points. We used a 3-deep lookahead with a search width of 3 at every level except the first when it was 5.

	Black	White
1.	K10	L9
3.	K9	K8
5.	J7	M10
7.	O12	L11
9.	L8	K12
11.	J13	O8
13.	N9	J10
15.	M7	L12
17.	L7	L13
19.	L10	L15
21.	L14	K7
23.	N12	M11

(White Wins)



Programmer's game analysis:

1. A standard move in the center region.

2. A close reply is wise.

3. This blocks white and extends a black row.

4. A standard blocking move with a small offensive threat.

5. A defensive move by black. J10, L10, or L8 would have been better. Nevertheless, our program rates the position at −10 or somewhat unfortunate.

6. It took a long time to come up with this rather mediocre move. Actually nothing looks very promising. This is typical of early game play. Having a library of openings would solve this problem.

7. Very defensive. Black should be more agressive.

8. A fairly good move in that it blocks up black and gives white some offensive potential. Our evaluation has the game even now.

9. Good defensive move. Normally, however, black is on the offensive at this stage of the game.

10. A little offense at last. The game is still rated as even.
11. It might have been wiser to block at the other end where more white stones are concentrated.
12. Not really brilliant. M12 was undoubtedly checked but rejected because of the influence of black's 7.
13. A forced move.
14. A defensive move. This square became important after black's 9 and 11. We are now unhappy to extent of −10.
15. Black has the opportunity to take the offensive, say at N10 or M8. This move is just so-so.
16. We are now unhappy to the extent of −40 which is actually not all that serious. A defensive choice at L7 or N6 loses out to an offensive move.
17. So black takes the offensive.
18. Our evaluation reads −42 and we go into panic mode briefly. A forcing move is located. The finding of the forces at moves 18 and 20 has blurred our evaluation of the situation. Once these have been made we will see how bad things really are.
19. No choice.
20. We are now at −44. The program may have located an interesting combination involving M14 and M12.
21. No choice.
22. With no more forcing moves to obstruct the program's lookahead, it clearly sees that there is trouble brewing in the southeast quadrant. The rating goes to −84 and again we enter panic mode and make a defensive move.
23. In retrospect, this turns out to be weak in comparison to moves in the southeast quadrant. For example, try black's N6, K6, L5, and L6. But this may be beyond black's lookahead capability.
24. Our rating is back down to −44 due, in part, to the finding of some offensive potential following our move. Look at M13 and J11. Both are crossed threes. Black appears to have forced us into a winning position. The only reason that our evaluation is still negative is because of black's strength at the bottom.
25. This is a horrible position for black, since white can make crossed threes at either J11 or M13. (And, in fact, we move at M13 and win the game.) The only way out is to take the offensive and use forcing moves. It is a very complicated situation worthy of being put in a Gomoku puzzle book. Consider this sequence of forces:

N6 — 05
N7 — N8 (If N5, then black N10, M8, O10, O11)
O7 — P7
L4 — M5
L6 — L5 followed by crossed threes at K6.

Now even if black had tried it,he might not have actually found a winning sequence. The length of this forced win may be beyond the horizon of black's lookahead. But at least it should have been tried by pushing out 4-in-a-rows and other forces and hoping that a win appears over the horizon.

Progress report

The latest report from Dr. Shein Wang discloses that the GOMOKU ladder competition is very active with surprising developments occuring at all levels. "One of the newest entrants to our ladder," writes Dr. Wang, "is Mitch Bogdanowicz, of 41 Meadow Drive, Spencerport, NY 14559. Mitch says he has a strong Z-80 program and should more than hold his own against those he challenges on the ladder. During the North American GOMOKU tournament, there was one disputed game.

"In the second game between Compton and Johnson/Coston (won by Johnson/Coston as black,) Mike Compton contended that at the 17th move of the 31-move game his opponents had run into a program bug and had crashed, thereby losing the game by the official rules. However, Johnson explained that at that particular move, a keying error had been made and, by the rules, such keying errors did not disqualify programs. Because the game was played by long-distance telephone communication there were no official judges present at either terminal. If this problem is ever resolved it will have to come from personal arbitration. So, the current standing could be either the A list or the B list. As soon as the disputed game between Johnson and Compton is decided, an official standing will be issued.

List A	List B
1) Johnson/ Coston (5-1)	1) Johnson/ Coston (4-2)
2) Day (3-3)	2) Compton (3-3)
3) Compton (2-4)	3) Day (3-3)
4) Wang (2-4)	4) Wang (2-4)

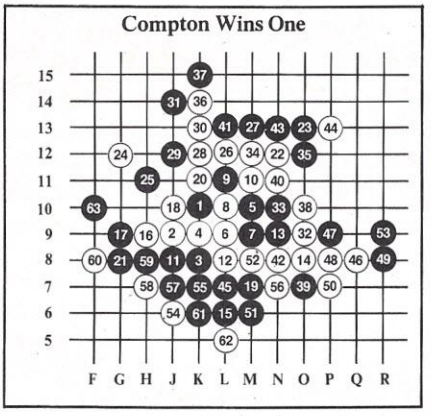
"Generally speaking, all programs did well at the tournament. Johnson/Coston's program is the most consistent. It played six good games without any serious mistakes. Compton came up with a surprisingly good program on a 32K North Star. It has a good book which takes it through the difficult opening stage in fine shape. Due to the slower speed and the smaller region of the micro, it was severely handicapped. Future improvements will more or less depend on hardware improvements of the micro itself.

"John Day's program started to play with authority just before the tournament. And will be a lot better for the next tournament. My program joined the tournament on short notice. It was the fastest, which means that there is a lot of room left to make it think harder. It also lost several games due to a poor opening book. I think it will make a much better showing next time.

"Unfortunately, Joel Smith quit the tournament because he had to go to California for two weeks. I'm sure he was very disappointed. His program produced the quicker wins in the last tournament. If we were awarding points in proportion to the length of games in case of a split, last year, he would have won that tournament. His program would have challenged Johnson/Coston for the title. We look forward to Joel's return for our next tournament.

News and annotations on European-Tournament games as well as World Championship games will be sent along shortly."

(Anyone interested in writing his own GOMOKU program and joining this tournament, see the ad in Computer Chess Classified Section.)



Annotations by Dr. Wang

	Compton Black	Johnson/ Coston White
1.	K10	J9
3.	K8	K9
5.	M10	L9

5. M10. Black usually plays L9 here followed by White's M10 or J11.

7.	M9	L10
9.	L11	M11

9. L11. A better play is L8. Then, either 10. M11, 11. J8 or 10. J8 11. M11. In either case, Black still has the initiative. In the actual game, White stops Black by 11. L8.

11.	J8	L8
13.	N9	O8
15.	L6	H9
17.	G9	J10
19.	M7	K11
21.	G8	N12

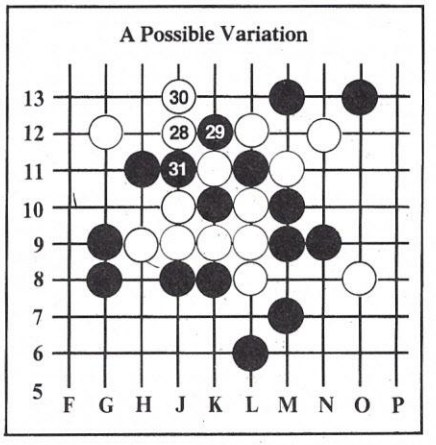
15. L6. Black goes defensive.

16. H9 and 18. J10 start White's attack. However, blocking with 19. M7, Black also increases his potential at the lower part of the board.

20. K11 is questionable because 21. G8 gives Black a concrete threat; e.g., the sequence H8, K6 and M6. A better idea for White's 20th move would be G8.

The attack by White failed because if at move 28 White continues with 28. J12, then 29. K12, 30. J13, 31. J11 and Black has 3-in-a-row. This prevents White's continuation with his 32. H13, 33. G14 and 34. J14 or K13. (See Figure 1.)

23.	O13	G12
25.	H11	L12



24. G12 (and 25. H11) was a fatal mistake for White. He cannot now block all the Black threats.

27.	M13	K12
29.	J12	K13

30. K13. This push by White gives the program a false sense of security.

31.	J14	O9
33.	N10	M12
35.	O12	K14
37.	K15	O10
39.	O7	N11
41.	L13	N8

42. N8. White has run out of threats and tries a block.

43.	N13	P13
45.	L7	Q8
47.	P9	P8

45. L7. Black has a win here by playing J15 followed by L15 to create a 3-3. Note that White cannot play the sequence P8 then Q8 (4-4) because Black's M8 makes a 4.

49.	R8	P7
51.	M6	M8

50. P7. Even if White plays, instead, K7, Black still wins with H8, M6, and K6.

53.	R9	J6

53. R9 is hard to figure out. Even with this slip, White still cannot save itself.

55.	K7	N7
57.	J7	H7
59.	H8	F8
61.	K6	L5
63.	F10 (Black wins)	

(Compton played Johnson/Coston two games, first as black then as white. Interestingly, black won both times.)

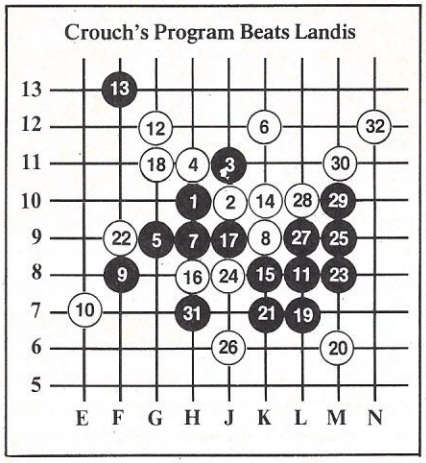
Winning Ways

A letter from Geoffrey A. Landis, MIT Rocket Society, MIT Branch PO Box 110, Cambridge, MA 02139, describes a test game he played against Jerry Crouch's GOMOKU program which appeared in the October 1979 issue of PC. "I figure that by this time," writes Geoffrey, "somebody else has already brought it to your attention. Jerry Crouch's program for GOMOKU on page 84 of your October 1979 issue contained an error. Line 310 should be I1=9, not I2=9 as printed. The effect of this error was to make the computer effectively 'blind' to threats of right diagonal wins. When I wrote the program I added some graphics and also made a few changes to make it run faster (by lowering the amount of points searched). I've enclosed a printout of the computer winning the first game I played against it! I hope that most of your readers caught the error before spending too much time on it!"

	Geoffrey Landis Black	Computer Program White
1.	H10	J10
3.	J11	H11
5.	G9	K12
7.	H9	K9
9.	F8	E7
11.	L8	G12
13.	F13	K10
15.	K8	H8
17.	J9	G11
19.	L7	M6
21.	K7	F9
23.	M8	J8
25.	M9	J6
27.	L9	L10
29.	M10	M11
31.	H7	N12 (White Wins)

The following rules followed in

COMPUTER GAMES



GOMOKU computer play can be of help when constructing a program:

Game Length

Each program will have 15 minutes of clock time to make an initial 40 moves. If a game requires progression beyond 40 moves/player, additional time will be allocated by assigning five minutes of additional clock time to each program for every subsequent block of ten moves required. Use of more time than allocated will result in game loss.

The elapsed time for a player will be provided when the opponent's move is relayed to the player. The elapsed time of an opponent will be transmitted only upon program request and only when the requestor's clock is running.

A draw will be declared after each program has made 50 moves. A draw may be declared by mutual consent of the players before the 75 moves/program is reached.

Game Procedure

Each round will consist of every program playing every other program twice. Each program will have an opportunity to move first.

The board will consist of a 19×19 matrix.

Move position markers consist of black and white "stones". Black moves first and may begin at any board position.

Once a stone is placed on the board, it remains in the same location until the game is terminated.

The board reference coordinates are alphabetic (horizontally) and numeric (vertically.) Coordinate A-1 occurs in the lower left hand corner of the board. Alphabetic coordinates exclude the letter I and include the letter O ("oh").

Program parameters may not be reset while playing a given round.

Machine failure during a round will not be cause for stopping the clock or suspension of a game and/or round unless mutually agreeable. The suspended game(s) will be rescheduled if time is available. Suspended game(s) that cannot be rescheduled will be awarded to the program that did not fail.

Illegal moves

If a player makes an illegal move and it is recognized as such by an opposing program, the opposing program wins.

If an illegal move is not recognized by an opposing computer program, play will proceed from that point. The move will be considered to be legal immediately after the second player fails to recognize its illegality.

If an unrecognized illegal move causes one stone to be placed upon another stone, the first stone will be removed from the board.

Winning Positions

A winning position requires five and no more than five stones of the same color immediately adjacent in a row (horizontal, vertical, or diagonal).

A row constituting more than five immediately adjacent stones of the same color is not a winning position.

All winning positions must be demonstrated by playing to game end.

Claiming a win

A player does not win unless the player **claims** a win. The first player to validly claim a win for his own position wins the game.

If a player fails to claim a win, he may do so at a later time, providing he has a winning position at that time and his opponent has not validly developed and claimed a winning position.

If a player fails to claim a win, his opponent may proceed with his own game, ignoring his opponents winning position. The opponent may also point out the winning situation and claim a draw

Anyone **falsely** claiming a winning position loses the game. False win claims will be judged by a human referee. Protestations to a false game may be made either by a computer program or by a human representative within 15 minutes of a victory claim.

Old Hands and New Games

BY THOMAS A. THROOP

This is an analysis of four deals played with George Duisman's bridge programs as modified with my own standard dealing sequence. The deals: Deal #40 at 4 hearts; Deal #41 at 2 no-trump; Deal #52 at 4 spades; Deal #54 at 3 no-trump.

Deal #40:

NORTH (Dummy)
♠ AQJ
♥ K8
♦ KQ852
♣ 963

COMPUTER WEST
♠ 7
♥ J74
♦ A10764
♣ A1052

COMPUTER EAST
♠ K98652
♥ 92
♦ J3
♣ QJ7

SOUTH (Declarer)
♠ 1043
♥ AQ10653
♦ 9
♣ K84

How many of you made 4 hearts? With good play and a little help from the Duisman program it is possible to make that contract. On the opening lead of the 7 spades from West I finessed dummy's jack. (With good defense by East-West, the king of spades had to be on-side for 4 hearts to succeed.) Unfortunately, East produced the king to win the trick and then returned a spade which West ruffed with the 4 of hearts. The contract now appeared hopeless. But see what happens with my line of play, shown in tableau:

		W	N	E	S
Trick	1	7S	JS	KS	3S
	2	4H	QS	2S	4S
	3	AD?	2D	3D	9D
	4	4D	QD	JD	4C
	5	7H	KH	2H	3H
	6	JH	8H	9H	AH
	7	2C	3C	5S	QH
	8	5C	6C	6S	10H
	9	10C	9C	8S	6H
	10	6D	5D	7C	5H
	11	7D??	AS	9S	10S
	12	10D	KD	JC	8C
	13	AC	8D	QC	KC

Tricks N—S: 10 Tricks E-W: 3

At trick 3, West cashed the ace of diamonds. This was not a good play because it helped declarer set up some good diamonds in the dummy. West continued with the diamond 4 on which I played North's queen. Now I played six rounds of trump, as shown in the tableau. Then, on my lead of the 10 of spades at trick 11, West incorrectly discarded the 7 of diamonds. This established dummy's 8 of diamonds, which is visible, by a club discard. (The ace-of-clubs-discard would have been perfectly safe, because the lead was in dummy for tricks 12 and 13.) Thus, I successfully made 4 hearts. (I would like to know if any reader made it with a different line of play?)

Deal #41:

NORTH (Dummy)
♠ 98
♥ KJ52
♦ KQ843
♣ 43

COMPUTER WEST
♠ AKJ2
♥ Q43
♦ 5
♣ AQ1072

COMPUTER EAST
♠ 1054
♥ 10986
♦ J1072
♣ 85

SOUTH (Declarer)
♠ Q763
♥ A7
♦ A96
♣ KJ96

On this deal, played at 2 no-trump, the Duisman program opened the deuce of spades. The 7 of clubs would have been a better lead from West's viewpoint, because he has greater length in that suit. On the deuce of spades I played the 8 from dummy, East played the 10, and I won with a queen. Hoping for 5 diamond tricks, I then played a diamond to North's queen and another diamond to my ace. West discarded the 2 of clubs, revealing the 4-1 diamond split. At trick 5, I continued with diamonds by playing dummy's king, followed by the diamond 8. On these diamond plays West discarded his good jack and king of spades!?

After winning dummy's diamond 8 with the jack, East returned the 5 of spades to West, who now had only the ace to cash. The play continued as shown in the tableau below:

		W	N	E	S
Trick	1	2S	8S	10S	QS
	2	5D	QD	2D	6D
	3	2C	3D	7D	AD
	4	JS??	KD	10D	9D
	5	KS??	8D	JD	6C
	6	AS	9S	5S	7S
	7	7C?	3C	8C	9C
	8	10C	2H	4S	6S
	9	QC	4C	6H	3S
	10	3H	5H	8H	AH
	11	4H	KH	9H	7H
	12	QH??	4D	5C	JC
	13	AC	JH	10H	KC

Tricks N-S: 11 Tricks E-W: 2

AT trick 7, West played the 7 of clubs. (The 3 of hearts would have been better.) I won this trick with the 9 of clubs and then cashed my two good spades which were kindly set up by West. Then, I played the ace and king of hearts. Now, at trick 12, when I cashed North's good 4 of diamonds, West made the same type of error as noted in the previous deal; he discarded the good queen of hearts, rather than his ace of clubs. Thus, I scored eleven tricks. (How did your play proceed?)

Deal #52:

NORTH (Dummy)
♠ A983
♥ 842
♦ A4
♣ Q965

COMPUTER WEST
♠ 5
♥ J65
♦ QJ10852
♣ 1087

COMPUTER EAST
♠ KJ10
♥ KQ73
♦ 76
♣ AJ42

SOUTH (Declarer)
♠ Q7642
♥ A109
♦ K93
♣ K3

Against 4 spades, the Duisman program opened the queen of diamonds, a proper lead. I made only 3 spades on this deal, losing one spade, one club and two hearts. (Did anyone make 4 spades?)

Deal #54:

NORTH
(Dummy)
♠ 105
♥ 7652
♦ K8762
♣ A8

COMPUTER WEST	COMPUTER EAST
♠ AQ2	♠ 8643
♥ QJ3	♥ K1084
♦ Q9	♦ J104
♣ J9754	♣ 102

SOUTH
(Declarer)
♠ KJ97
♥ A9
♦ A53
♣ KQ63

On this deal the TRS-80 version of the Duisman program defended differently than the PET version. With the PET version, West opened the queen of hearts against 3 no-trump, and East, for reasons unknown, played his king on this trick. I ducked. East now returned the 10 of hearts rather than the 4. I won with the ace, then played the ace and another diamond. On West's queen I played small from North. I had to lose one diamond trick, and it was preferable to have West on lead.

After cashing his jack of hearts, West had a problem in continuation. He elected to play the ace of spades. Now, the rest of the tricks are mine, and I made 3 no-trump.

My PET version opened the ace of spades against 3 no-trump. This was not a good choice. Then followed a worse play of the queen of spades. Eventually I made 5 no-trump, losing only the ace of spades and a diamond. (What were your results on the play of this deal?)

For those of you who would like to add my standardized dealing sequence to your Duisman program, if you will send me a check for $3.00 (to cover costs) to 8804 Chalon Drive, Bethesda, Md. 20034, I shall be glad to send you the code for the standarized dealing sequence. For those of you who already have the standardized dealing sequence or are planning to order it, here are some more interesting deals to play: Deal #56 at 4 spades; Deal #58 at 4 hearts; Deal #60 at 2 no-trump; and Deal #67 at 3 no-trump. These deals will be discussed in next month's column.

A computer program for another classic card game has come to my attention. Mike Pershing of 873 North Monroe Drive, Xenia, Ohio, 45385, has written a computer program for the game of EUCHRE. It is written for the PET computer and is available from Mike for $10.00. For those of you ordering a program cassette, please specify his 8K or 32K version.

The program cassette contains two different variations of the EUCHRE program. "EUCHRE I" is strictly a solitaire version in which the computer plays three of the four hands (all with equal strategy) with a single human player. The cards of the human player, known as the "challenger", are continuously displayed on the computer screen.

"EUCHRE II" can be played by one person or even entirely by the computer, but it is intended for use by several human players. For this reason, the dealt hands are not permanently displayed on the screen.

The program begins by asking which players are human. You may have human and computer players in any combination. During the play the computer shows each human player his hand "privately". This is accomplished by the player whose number is displayed pressing a key, causing his cards to be displayed (presumably while no one else is looking). A second touch of a key erases the cards.

EUCHRE is played with several variations, ranging from the number of cards used to the number of players in the game. however, the one common rule is the ranking of the jack of the trump suit as the highest card, followed by the jack of the other similarly colored suit, and then the ace, king, queen, ten of trumps. The rank in the non-trumps suits is as usual (ace, king, queen . . .).

The game played by this program involves four players, some of whom may be the computer. Players on opposite sides of the play area are partners and work as a team to take as many of the five tricks as possible. The starting dealer is chosen at random, but there-

after the deal moves clockwise. In all instances the actual dealing is done by the computer, but all advantages inherent in the dealing position remain. Since only 24 cards are used (9's-aces) and only 20 are dealt, there are four remaining cards. One of these is revealed by the dealer, and it denotes the proposed trump suit.

A form of bidding then begins, starting to the dealer's left, where players in turn have a chance to accept or refuse that suit as trump. When one team member accepts, play begins, and the accepting team (the "makers") are obligated to take at least three of the five tricks. The dealer's advantage here is that he trades one of his weak cards for the upturned card, giving him an extra trump. The player to the left of the dealer then begins play.

If no one wants the upturned card as trump after one complete round, another round of "bidding" continues where players may name a suit of their choice (but *not* the one previously rejected) with the same obligations for taking tricks. In this case the dealer loses his chance to exchange cards, but the player to his left still leads.

When accepting or naming trump, a player may choose to increase his team's possible points by electing to "go along". The game is then played without the help of his partner. (It may be a bit unsettling the first time your computer partner decides to play without you!) Along with the increased risks is a chance at the added bonus points received when successfully taking all five tricks.

In all cases, if the makers take three of four tricks, they score one point. But if they take all five they receive two points and four points if playing alone. However, if the makers fail to take at least three tricks, they are said to be "EUCHRED" and their opponents score two points.

The game continues until a score of 10 is reached. The best of three games might then be played to constitute a match.

To illustrate the play of EUCHRE by Mike's program, consider the play of one of the deals from a game Mike played against his computer program in the solitaire mode. The deal:

NORTH
(Computer)
♠ –
♣ K
♥ 10K
♦ KA

WEST
(Computer)
♠ AJ
♣ J10Q
♥ –
♦ –

EAST
(Computer)
♠ 10
♣ –
♥ JQ
♦ 10Q

SOUTH
(Challenger)
♠ Q9
♣ A9
♥ 9
♦ –

Dealer: South
Turnup: KS

The bidding: "pass" by West, "pass" by North, and "pass" by East. Mike (South) accepted spades as trump, trading his 9 of hearts for the king of spades. The play went as shown in the accompanying tableau. Mike says his program "tricked" him into accepting spades, West having the three top trump cards.

		W	N	E	S
Trick	1	AS	10H	10S	9S
	2	JC	KD	10D	QS
	3	JS	KH	QD	KS
	4	10C	KC	JH	9C
	5	QC	AD	QH	AC

Tricks N–S: 2 Tricks E–W: 3

(The jack of spades is the highest ranking card in this deal, followed by the jack of clubs. Then, in order, come A, K, Q, 10 of trumps. Ranking in non-trump suits is unchanged.)

Readers with questions on Mike's EUCHRE program, should contact him directly. I am sure that he will be very glad to respond.

(I look forward to hearing from those who are developing their own bridge software or who have interesting results to report from play with one of the consumer products presently on the market.)

Do you have any card games in program form? If you do, please let us know.

(Write to: Computer Bridge Dept.)

Increased Power for Your TRS-80

BY KEN MAZUR

The Johnston family of Racet Computers evidently has a mission in life — to make the TRS-80 microcomputer think and act like it's a minicomputer. How do they do it? By creating software packages that make the machine do just about everything except get up off the desk and walk around by itself.

REMODEL (REnumber-MOve-DELete) gives you enhanced capabilities required to efficiently develop and maintain Basic programs. *Remodel* is a system program that resides in approximately 2K of protected upper memory while your Basic program is in the lower portion of memory. *Remodel* commands may be intermixed as often as required with standard Basic TRS-80 operations such as CSAVE, CLOAD and EDIT without having to reload *Remodel*.

Features of *Remodel* include renumbering any portion or all of a Basic program (references to changed statement numbers in all other statements within the program are also changed); moving any portion of a Basic program from one location to another (statements are automatically renumbered as required); and deleting any portion of a program.

Remodel is loaded via the system command after protecting memory. When the second system prompt appears, you enter the slash (/) and READY appears. You must then *type* CLEAR. Load your Basic program and begin work. When you need *Remodel*, call it up by entering USR(0). When you're done, hitting the "Break" key returns you to Basic. You can even load *Remodel after* you have a Basic program in memory without destroying the Basic program. Memory size, however, should be set at power up time to reserve the required space for *Remodel*.

PROLOAD (PROgram LOADer), a subsystem of *Remodel* performs the following: loads all or any portion of a Basic program formerly saved by a CSAVE command; extends existing Basic programs in memory by adding portions or all of a program saved by a CSAVE; and renumbers separately the added program lines to conform to your programming requirements. The package also allows you to restructure the total resulting program by moving the added program lines to any location desired. You can save all or any portion of a Basic program in a compatible format that can be loaded by a CLOAD command and you can verify that data written to tape is correct.

Proload (Remodel must also be in memory at the same time in order to use Proload commands) takes up about 3K of high memory including the space for *Remodel*.

COPSYS (COPy SYStem tapes) is a useful utility for copying your machine language programs. The software package is a system progam produced by the Radio Shack Editor/Assembler and resides in the lower part of memory. Once loaded, five single-key entries allow you to load a program into memory (as many programs as required may be stacked in memory forming one large program); write existing programs stacked in memory to tape; reinitialize *Copsys*; verify an existing program in memory with the contents of another tape for equality; or terminate *Copsys* and return to the READY state.

The ability to merge several machine language modules into a single load module will be handy for those of you "into" machine language programming. This program works nicely with all machine language files written in Editor/Assembler format that have not been especially protected.

TIMSER (TIMe-SERies Analysis program), a Basic program by Racet, is loaded with the CLOAD command. Taking approximately three minutes to load, the program is structured to accommodate up to 100 data points.

The Time Series Analysis package includes both linear and curvilinear curve fits (regression analysis) with provisions for correction factors and functions, projection of data and other tools such as graphic displays of the results.

Timser requires dependent and independent variable data, and correction data and functions (if any) to be entered in DATA statements. Program space is allocated at the end of the program for these functions. All other program actions are accomplished in a question and answer format. A group of questions is asked at the beginning of the proram and the program then does the number crunching.

As there are many computations performed, *Timser* can require from three to five minutes to complete the calculations. To keep you informed of its progress, the display names the particular calculations as the computer performs those actions.

Upon completion of the calculations, the *Timser* menu is displayed and allows you to review Table 1 (Goodness of fit); run Table 2 (Curve data); run Table 3 (Confidence limits); review sum loops; display equation coefficients; graph the data out; and give a variance curve plot.

With GSF (Generalized Subroutine Facility) the Johnstons get into even more sophisticated packages. Documentation for the program is heavy and to lighten the load, Racet includes two Basic programs immediately following the two copies of GSF on the distribution tape. The Basic programs are used as examples in the documentation. Unless you read the GSF manual closely and from cover to cover before trying anything with your machine, however, you won't even know the Basic programs exist because there is no mention of the included programs until Appendix B — General Notes, on page 26. (As an aid to you, my cassette recorder counter gave the following figures: First GSF recording = 0 to 23; Second GSF recording = 25 to 43; First Basic program (examples 1 through 5 and 13 and 14) = 46 to 77; and Second Basic program (examples 6 through 12) = 80 to 111.)

There are 18 utility subroutines included in the package accessed through USR calls. Five subroutines provide for scrolling the screen up, down, left, right and for inverse graphic video. Two more subroutines draw horizontal

and vertical graphic lines of any length and at any location on the screen. (The example for these subroutines will blow your socks off when you first see it.)

Two subroutines are provided to duplicate a byte in memory which is useful for setting arrays to zero or rapidly placing rows or columns of repeated characters on the video. A "move data" subroutine moves data from one location in memory to another. One function of the subroutine would be to move data into protected memory to provide a "common" area that can be passed from one Basic program to another.

Additional subroutines compress data in memory (by removing repeated characters) and read/write subroutines provide you with the capability of reading an entire array or screen image with one command. Data validity checking is performed automatically.

Probably the two most powerful subroutines in the package are the in-core sorts. When Racet claims its sorts are *fast*, believe it!

GSF is a system program that resides in protected upper memory along with the GSF subroutines. GSF provides an interface between your Basic program and the subroutines which are accessed by USR calls. Programming involves determining the number of arguments to be passed to GSF, which then passes control to the subroutines you want. A specific number of USR calls are required for each subroutine as explained in the documentation.

Using the GSF package is easy but exacting. For instance, if a bad argument is passed to a USF function and your Basic program issues an error statement, GSF still expects the sequence to continue. If you correct the problem and type in a RUN, GSF is not automatically reinitialized and can cause unpredictable results (this problem can be overcome by adding a POKE statement in the beginning of your Basic program). If you use the "move subroutines, you have to be careful that you don't exceed the limits of your specified arrays because GSF doesn't check for limits. If the limits are exceeded, system information may be destroyed, again causing unpredictable results.

If you are still learning Basic, the GSF material may be heavy going but if you feel comfortable with Basic programming, the GSF documentation will take you step by step through the process of using this powerful set of routines.

Racet also vends *Infinite Basic,* which provides you with approximately 80 extra Basic commands (over 100 if you count the *Infinite Business* Add-on package) with more to come, according to the Johnstons. The add-on commands may be selectively loaded into any place in memory. The package comes with a relocating loader that asks which commands you wish to add on and where you want them located in memory. The loader then reads the relocatable data files and selects the required functions from them. The distribution tape for this package contains over 30K of machine code which will generate an object file of over 12K — more machine code than is in your Basic ROM!

With *Infinite Basic,* you can perform such operations as sorting; string centering, rotation, truncation or justification; data compression; string translation; video display manipulation; matrix inversion; dynamic array reshaping; and many more.

The matrix functions are the equal of any that I have seen on either mini- or maxicomputers and the accuracy is solid.

COMPROC (COMmand PROCessor), an easy-to-use system, enables you to automatically execute a series of TRSDOS system or Basic commands. Command files may be created containing any logical sequence of system commands, Basic commands or data, and command files may be selectively executed, including initiation by the AUTO command at power-up time. Creation of command files is done in the standard manner using the usual Save and Edit operations of Basic.

You initiate *Comproc* by entering a standard DOS command. *Comproc* scans your command file, extracts information and forms a compressed control program. The compressed control program is relocated to a temporarily reserved area and passes the desired information to the system as if you were entering the commands from the keyboard. After all statements have been processed by *Comproc,* it releases any reserved area and returns control to the keyboard.

Here's an example. Let us assume you have a data base management program that manipulates information on a class of students to include such things as their grades. Further assume that you utilize Racet's in-memory sorts to rank order these students in various ways depending on different exam grades. Your normal mode of operation might be to boot your system; load KBFIX; load the Generalized Subroutine Facility; load Basic; and load and run your Basic data base/grading program. With *Comproc,* you can create a command file that will do all of these things in sequence so that you have to do is boot the system. *Comproc* will load all the files you require and all you have to do is start using your Basic program when it begins.

All Racet programs (except *Copsys,* which is a tape oriented program) work on disk. In addition to the packages described, Racet has Disk Sort Merge (DSM) programs for both the Model I and Model II TRS-80s; a development system package (editor/assembler, disassembler and machine language "Superzap") for the Model II; and a Model II GSF.

Racet is a family company with Mrs. Ron Johnston listed as owner, production chief, shipper, phone answerer and performer of other duties that come up during a typical work week. Scott Johnston is chief programmer for the firm. Scott was department head of Computer Sciences at Michigan Tech before moving to California. Ron Johnston and his son contribute programming, marketing, bookkeeping and whatever else is needed.

Remodel & Proload (specify 16, 32 or 48K) sells for $34.95; Model I *GSF* (specify 16, 32, or 48K) is priced at $24.95; *Copopsys* is $14.95 as is *Timser*; *Infinite Basic* goes for $49.95 with the *Infinite Business* module sold separately for $29.95; *DSM* for a 32K, two drive, Model I system is $75 on disk and the 64K, one or more drive Model II version is priced at $150. *Comproc* for the Model I is $19.95. The Model II development package is $100 on disk.

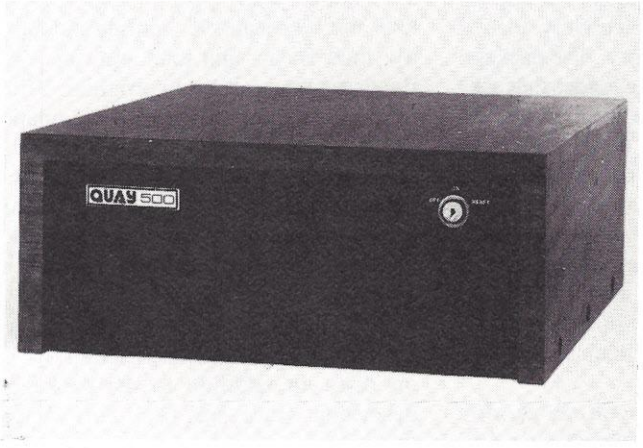
For more information contact Racet Computes, 702 Palmdale, Orange, CA; (714) 637-5016.

WHAT'S COMING UP

SYSTEMS

Flexible Disk-based Microcomputer Systems

Quay Corporation has added two new models to its CP/M-compatible desktop microcomputer series. The Quay 500 and 520 systems combine the performance and reliability advantages of a single board computer, with the cost-effectiveness of 5-1/4 inch flexible disk drives, Quay said.



Both models utilize the Z-80-based, 94F/MPS single board computer and include 32Kb dynamic RAM, expandable to 65Kb; DMA-based disk access; two 5-1/4 inch flexible disk drives; the CP/M (Version 2.0) disk operating system with PROM-resident boot program; RS232C or TTY serial port and, a Centronics-compatible line printer.

The Quay 500 system provides a formatted disk capacity in excess of 400 kilobytes and has a single unit price of $2500. The 520 system has a formatted disk capacity in excess of 800 kilobytes and has a single unit price of $3200. Product availability is thirty days after receipt of order. For additional information contact Quay Corporation, P.O. Box 386, Freehold, NJ 07728; (201) 681-8700. *Circle No. 184*

Hard Disk Options Highlight System Debut

A 6809-based series of Chieftain Business Systems featuring multi-user and 20 megabyte hard disk options has been announced by Smoke Signal Broadcasting.

The new system is configured around the Chieftain microcomputer with 64KB of main memory and the DCB-4 disk controller capable of handling four 8″ floppy disks, each storing a full megabyte of data. The hard disk provides 10MB of fixed and 10MB of removable storage and can be accessed by up to 4 users.

The 6809 microprocessor lets you run applications programs written in Basic at over two and one-half times the speed of comparable 6800-based computers, the company said. A wide range of programs are available for business applications including Payroll Processing, Inventory Control, Accounts Payable, Order Entry, Accounts Receivable, Invoice Entry and General Ledger. In addition, the Chieftain series of business systems supports Cobol, Fortran, and UCSD Pascal.

Up to 16 64K blocks of memory can be addressed, allowing up to one megabyte of memory to be accessed. To meet specific requirements, the entire megabyte can be configured into 4K blocks.

The Chieftain Business System's basic configuration also includes a 1920-character video display terminal and either a high-speed line printer or letter-quality daisywheel printer. Word processing software is standard.

Prices range from $5000 to $8400, depending on disk storage and printer, with 30 day availability ARO. The hard disk and multi-user options cost an additional $8500. For more information contact Jim Allday, Smoke Signal Broadcasting, 31336 Via Colinas, Westlake Village, CA 91361; (213) 899-9340. *Circle No. 166*

Expandable Business System

Angel-1, a small business system, is suitable for word processing, payables and receivables, inventory, sales activity, check and expense register, name-address-appointments, client-patient records, library and special events. Optionally available are payroll, purchasing, general ledger, mailing list and communication.

Housed in a formica desk, it consists of a S-100 mainframe, Z-80 CPU, 64K RAM, two single sided single density 8″ floppy disk drives, an 80 character ×24 lines CRT and a daisy-wheel printer. A locking file cabinet stores the diskettes, manuals and supplies. The desk can be set up for left or right hand operation.

The system may be expanded to 256K RAM, four double sided double density 8″ disk drives, a hard-fixed or cartridge disk and multiple CRTs.

Angle-1 is priced $7995. For locations with limited space the Angel-1 is available in a desk-top enclosure for $7795. Delivery is presently 30 days. For more information contact E & U Engel Consulting, 1719 So. Carmelina Ave., Los Angeles, CA 90025; (213) 820-4231. *Circle No. 169*

Portable Computer With Bubble Memory

Findex's portable business computer features bubble memory, an expanded keyboard, a lightweight, flat, gas plasma display, and a built-in 80-132 column, plain paper printer.

This terminal-sized microcomputer can have up to 2 million characters of non-volatile solid state bubble memory mass storage, or up to 400,000 characters on a built-in mini-floppy diskette drive; RAM is from 48K to 2 megabytes. It interfaces to a variety of peripherals such as large printers or multiple hard disk drives. It has I/O expandability; serial, parallel and S-100 Bus interface are standard. Audio-cassette recorder jacks and acoustic coupler are optional.

Findex is programmed in business Basic and supports a Fortran, Cobol or a Basic compiler as well as a Macro assembler; APL and Pascal can also be used. The Basic includes a comprehensive file management capability.

The system weighs 31 pounds and measures 17-1/2 x 21-1/2 x 8-1/4. System prices start at $5980. For more information contact Findex, 1625 W. Olympic Blvd., Suite 808, Los Angeles, CA 90015; (213) 380-6950.
Circle No. 187

Three Microcomputers for the Price of Two

Commodore Business Machines, Inc., permits any qualified school district or educational institution to purchase three microcomputers for the price of two through August 1980.

Commodore's "Three for Two" special offer applies to the firm's complete line of Pet and CBM models, available in 8K, 16K and 32K memory capacities.

Under terms of the promotion, the first two computers must be purchased at list price from a Commodore dealer. The third computer, designated the "Teachers' Pet," will be donated free from the manufacturer. All three units must have the same amount of memory to qualify.

Commodore computers consist of a fully integrated CPU with a built-in CRT display and typewriter-style keyboard. The units are 16.5″ wide, 18.5″ deep and 14″ high, weighing 44 pounds. Prices range from $795 for the 8K device to $1,295 for the 32K model. For further information contact Glenn Baylor, Commodore Business Machines, 3330 Scott Blvd., Santa Clara, CA 95051; (408) 727-1130.
Circle No. 190

PERIPHERALS

Pascal Terminal

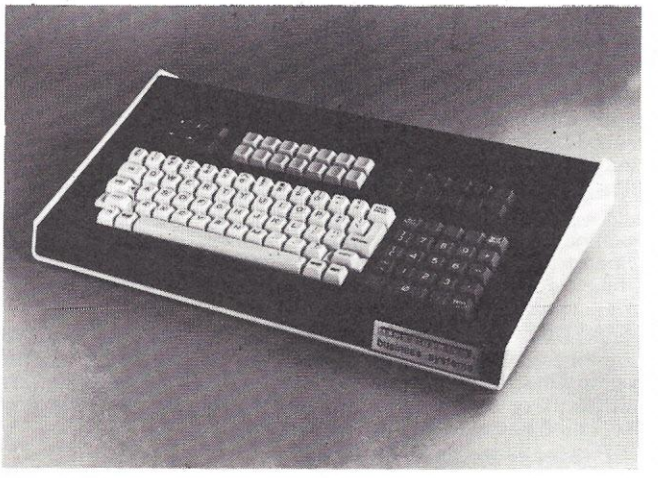
The ACI Pascal Video terminal is an optimized twelve inch CRT (24 lines by 80 characters) for use with the UCSD Pascal Operating System or other applications requiring similar video terminal capabilities. It incorporates a separate "ETX" key along with standard UCSD Pascal X-Y cursor addressing. "Home" is defined as the upper left-hand corner.

The terminal provides standard upper/lower case 96 ASCII character set. Cursor display is switch selectable for steady or blinking underline or block. Character display is white characters on black background. It accommodates several international languages character displays (USA, UK, French, German, Spanish, Danish/Norwegian and Swedish/Finnish) by internal switch changes (no optional ROM required). The terminal also incorporated provisions to display 32 control characters. Characters are formed in a 5×8 pattern within a 7×10 dot matrix with descending cursor.

Price for the terminal is $6595. For further information contact Murray Shackelford, Associated Computer Industries, Inc., 17751 Sky Park East, Suite G, Irvine, CA 92714; (714) 557-0560. *Circle No. 145*

Word Processing Keyboard

Algorithmics has announced the KB-2100 extended English keyboard for its line of Algo-2100 Word Processing and office information systems. The detachable keyboard features 113 keys arranged in five major functional key clusters housed in a durable steel case with grey sides and a black top. The major keypads are color coded with the main keypad in ivory, numeric pad in white, and the three special function key clusters along the top in red, yellow and blue.



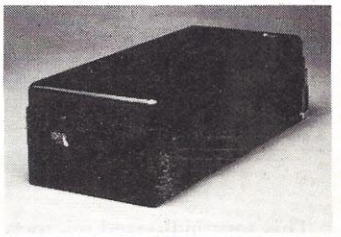
Mechanical keyboard features are designed to provide you with tactile feedback that closely matches the familiar feel of typewriter keyboards. You feel one pressure when the key is initially depressed which abruptly increases to a slightly

higher pressure shortly before the key reaches bottom. The main keypad features typewriter pairing with the five rows of keys arranged in a dished layout for accurate keystroking. Extra large sculptured keys are used for the traditional special actions such as carriage return, shift and tab. All keys have large caps with sharply defined edges. The shift lock key contains a small, red light to indicate upper-case mode. Actual keys use a capacitive action, insuring high reliability through elimination of mechanical switch contacts. To keep up with the fastest typist, the keyboard has "N" key rollover.

Used in the Algo-2100 word processing system, the main keypad plus the numeric pad produce 96 distinct characters including special punctuation such as brackets, greater-than and less-than symbols. A super shift key on the keypad allows the main keypad to produce an additional 20 special symbols which can be either technical/math or foreign characters. The functional keyclusters across the top of the keyboard permit you to perform text editing functions such as block move, word delete, forward search and cursor movement with a single keystroke. Cursor keys automatically repeat when held down; any other key can be made to automatically repeat by depressing the repeat key located on the main keypad. The keyboard also supports data processing and special applications software packages. In the Algo-2100 accounting applications, the numeric keypad speeds data input. For other special applications, plastic overlay cards can be placed around the functional keyclusters to define operations that might include "update stock price" or "delete customer account number".

The keyboard is standard on all Algo-2100 systems and is available as an upgrade to existing customers. Price is $450. Custom keycaps are available upon request. For more information contact Algorithmics Inc., 177 Worcester Rd., Wellesley, MA 02181; (617) 237-7226. *Circle No. 172*

Winchester Hard Disk Memory Systems



Lobo Drives International has announced the addition of three 10 Megabyte Winchester technology hard disk memory systems to its product line.

Identified as the Lobo Model 7710 T,A,S (T for TRS-80, A for Apple and S for S-100 computers) the system provides you with a cost-effective way to add 10 Megabytes of high speed mass storage. The Model 7710 comes complete with the IMI 7710 Winchester technology disk drive, Lobo intelligent controller, precision power supply, interface and related software.

Model 7710 is compatable with most TRS-80, Apple and S-100 disk operating systems and requires little or no changes to system software to operate. It is interchangeable with standard floppy disk drives and can be rack/slide mounted vertically or horizontally, or may be placed on a table top.

Prices begin at $4995. Delivery is 45 days ARO. For additional information, contact Mike Mock, Lobo Drives International, 935 Camino Del Sur, Goleta, CA 93017; (805) 685-4546 or (714) 641-1436. *Circle No. 193*

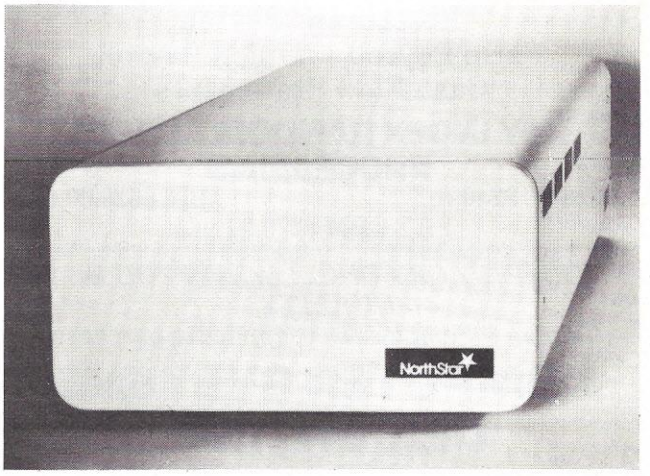
Hard Disk Enhancement

North Star Computers announced a new Winchester-type 18 Mb hard-disk enhancement for its Horizon computers. With the unit's backup system, the information modified each day is backed up on floppy disk, on a sector-by-sector basis providing a convenient way to save and restore vital information stored on a hard disk.

North Star's alternative to hard disks or tape systems is an incremental backup system, utilizing the Horizon's integral 5-1/4″ floppy disk drives. Data is saved on diskettes only if it has been changed since a previous backup. In a typical installation, backup will take only a few minutes a day.

With the new hard disk system, Horizon users will be able to add up to four 18 Mb Winchester-type disks, for a total system capacity of 72 Mb. Average access time is 78 ms, the company said.

The drive consists of the 18 Mb Winchester-technology hard disk, enclosure, power supply, controller, cables and



software. Software includes a hard disk operating system (HDOS), North Star Basic and back-up and recovery facilities. When four drives are used in the Horizon system, they may be daisy-chained to achieve the 72 Mb capacity.

WHAT'S COMING UP

Owners of existing Horizon computers can purchase the HDS-18 hard disk subsystem and connect it through the standard parallel I/O port connectors. Enhanced software (HDOS and Basic) is included with the 18 Mb drive.

Suggested retail list for a Horizon plus 18 Mb hard disk drive system (including 64K RAM, 2 quad-capacity mini diskette drives and one hard disk) is $9329. Up to three additional hard disks can be added to the same system at a cost of $4999 each. For more information contact North Star Computers, 1440 Fourth St., Berkeley, CA 94710; (415) 527-6950. *Circle No. 181*

Mass Storage System

A complete 13 to 104 million byte storage system, the RX-50 does not require direct memory access (DMA) capability on a host system. Utilizing single or dual Shugart SA4000 sealed media disks for mass storage, the RX-50 Storage Systems include a MC6800 based controller and an 8″ floppy disk for program loading and removable backup for files.

The buffered controller uses two 8 bit parallel data busses and handshake control logic that allows data transfer to be paced by a user system.

Sector sizes of 128, 256, and 512 bytes are supported for microprocessor users who want to add mass storage to their present systems. Write verification, parity checking and error recovery are all standard features.

Currently available in 13, 26, 39 and 52 megabyte capacities, 6 to 13 weeks ARO, the 104 megabyte version is anticipated for 2nd quarter 1980, when the Shugart 4 platter SA4000 is available. Prices start at $6990 for a 13 megabyte storage system in a sturdy cabinet with controller, 8″ floppy drive, power supplies, interface cable, power cord, and 2 dual sided program diskettes. For further information contact RX Electronics, 3769 North Dunlap, Saint Paul, MN 55112; (612) 484-1644. *Circle No. 175*

Input/Output Module

The Model 4051 I/O Module enables TRS-80 owners to control up to 8 inputs and 8 outputs independently but simultaneously. It's designed for energy monitoring and control in residential, commercial and industrial buildings and is useful for alarm systems, laboratory test control and process monitoring.

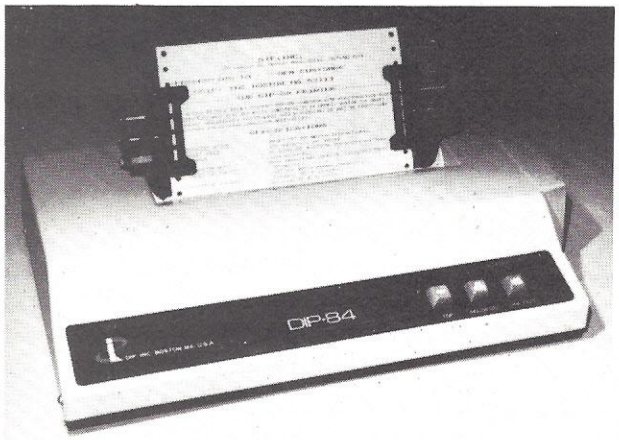
The 8 inputs may be used to monitor the status of 8 different inputs from switches, relays or logic outputs from CMOS or TTL logic (directly compatible). Each of the 8 separately controllable outputs is an electrically isolated relay contact. This contact can be used to control 120 VAC directly, or may be used to control the inputs of CMOS or TTL logic.

Price of the Model 4051 I/O Module including the interconnecting cable to the TRS-80 is $175. For further information contact CNI Electronic Associates, Inc., RD 2 Box 129AA, Orefield, PA 18069; (215) 395-6444.
Circle No. 178

Dot Matrix Impact Printer

Dip, Inc. has announced the second model of a series of Data Impact Printer, DIP-84. The model is a dot-matrix impact printer with tractor paper feed.

DIP-84 features 7 × 7 or expanded 14 × 7 matrix printing, upper/lower case character set, 100 characters per second bidirectional printout, roll or fan-fold paper, "finger clean" ribbon cartridge loading and a low profile. Tractor is adjustable for paper width from 2.5 inches to 9.5 inches, and is stepping motor controlled for better forms control.



Complete with microcomputer electronics, DIP-84 is designed to interface directly with mini and microcomputers. It is ideally suited for small business, educational, professional data processing, industrial, laboratory and personal computing applications.

With full 96 character ASCII set, it is capable of both upper and lower case printing at 80, 96 or 132 characters per line on a 8-1/2″ wide paper. Paper feed is at the rate of 10 lines per second. Operator control includes Power, Select/Deselect, Line Feed, Top of Forms, Self Test and Variable Vertical Tab setting. Interface options include Centronics compatible parallel, RS-232-C Serial or 20 ma Current Loop.

The printer measures 17.0″ × 9.75″ × 6.5″ and is priced at $795. For more information contact, Stanley K. Chao, Dip, Inc., 121 Beach Street, Boston, MA 02111; (617) 482-4214.
Circle No. 196

Pluggable Interface for Robot Turtle

Terrapin, Inc., manufacturers of the robot, Turtle, now provides a pluggable interface "TST-1" from any standard RS-232 line to the Turtle. The TST-1 plugs into any standard 100 volt wall socket, into any standard serial line, and into the Turtle. Thus, it makes Turtles pluggable for TRS-80, Apple, DEC and other computers.

The TST-1 provides the Turtle with the parallel interface as well as the necessary 18 volts DC (at 1.5 amps) of power that it takes to run one of the small robots. The TST-1 can be hooked between computer and Turtle, or between modem and Turtle. Schools can transport terminals, Turtles and TST-1 to any remote site, dial-up their host computer, and have a portable teaching unit.

TST-1 allows users to hook up more than one Turtle to a computer, terminal or modem. This enables TST-Is (set with different escape characters) to be hooked together, each one driving its own Turtle. The TST-1 has a settable baud rate, to allow it to operate at anywhere from 110 to 4800 baud.

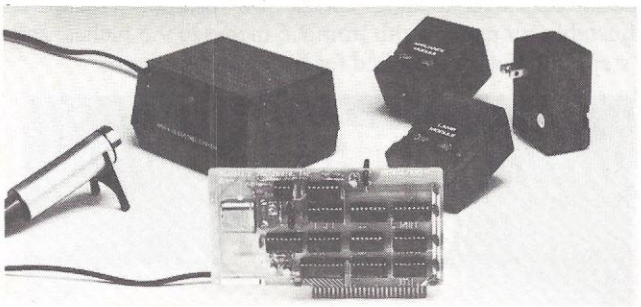
The TST-1 is 8″ × 7.5″ × 4″ and weighs 3 pounds, requires 110 volt AC current and a standard RS232 serial line input. It also provides for standard RS232 serial output, up to 8 bit parallel input and output and provides 18 volts DC unregulated at 1 amp. Initial price for the TST-1 is $150 or $125 with a Turtle. For more information contact Terrapin, Inc., 678 Massachusetts Ave., Cambridge, MA 02139; (617) 482-1033. *Circle No. 199*

Controller Board for Remote Devices

Introl/X-10 allows you to remotely control 110 volt AC devices by commands sent over existing building wiring. Utilizing the intelligence of the Apple computer, command signals are sent to a BSR/System X-10 Command Console.

The controller board plugs into a peripheral slot of the Apple. It transmits control signals with an ultrasonic transducer to the BSR/X-10 Command Console which may be plugged into any convenient AC outlet near the computer. On command from the computer, the console sends signals to remote modules located at the devices to be controlled. Up to 16 remote modules may be controlled.

Introl/X-10 provides control of devices at a given time, selection of daily or weekly schedules, specification of day of the week or data for a particular event, specification of intervals of time for an event and device wattage ratings for power consumption accounting for energy management.

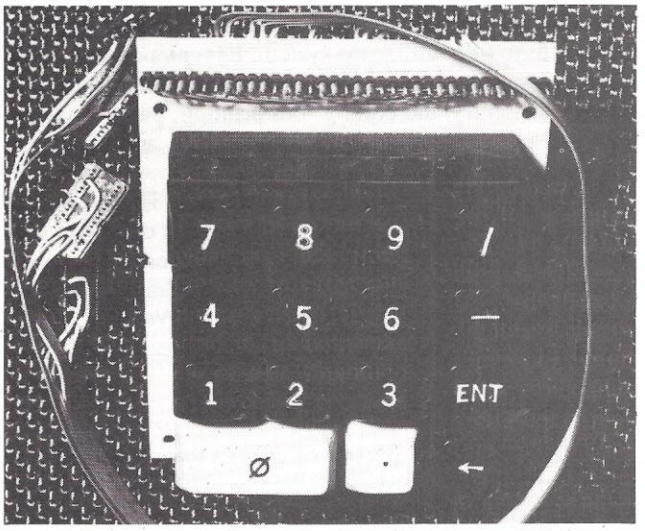


The System consists of the Introl Controller board with timer and ultrasonic transducer, the BSR/X-10 Command Console, and three remote modules for $279. Introl/X-10 Controller Card separately costs $189. Additional remote modules are available at $15. For further information contact Mountain Hardware, Inc., 300 Harvey West Blvd. Santa Cruz, CA 95060. *Circle No. 163*

16-Key Pad Kit for TRS-80

Microcomputer Technology Inc. has announced a 16-key numerical key pad kit for the TRS-80 suited to accounting applications or where a large volume of numerical entry is desired. Keys include 0 through 9, (-), (/), (.), backspace and enter key.

The unit is wired and requires no soldering. The kit comes with instructions, key pad, cable and a plastic overlay for the TRS-80.



The numeric keypad is available for $68 plus tax and shipping. For more information contact Microcomputer Technology, Inc., 2080 S. Grand, Santa Ana, CA 92705; (714) 979-9923. *Circle No. 157*

Interfacing TRS-80 to IBM Model 50

Mediamix has introduced a line of products that interface the TRS-80 to the IBM Model 50 Electronic Typewriter. These products include a hardware interface for connecting the Model 50 to the CPU or the Expansion Interface.

The Mediamix 50/80 Interface plugs into the IBM's circuit board; no soldering or modifications to the typewriter are required. Included with the 50/80 Interface is a software driver program that lets the user LPRINT and LLIST plus access all of the IBM 50's special coded functions such as underlining, indenting, tabbing and centering.

The 50/80 Interface sells for $200. Available software includes a similar patch for the Electric Pencil or Scripsit, a typesetting program. All software is available for tape, disk or Exatron Stringy Floppy based systems. For more information contact Mediamix, PO Box 8775, Universal City, CA 91608; (213) 475-9949. *Circle No. 160*

SOFTWARE

Apple II Payroll System

A weekly-payroll software package has been announced by NSP, Inc., for use on the Apple II computer. The package requires 32K RAM, two disk drives and a printer.

The system handles up to 200 employees with faster processing speeds for fewer employees. It can identify employees by name, social security number and address. Gross pay is computed from hours worked, including overtime and commissions. It derives net pay by computing and deducting federal, state, local and Social Security taxes and produces weekly, quarterly and annual employee pay reports plus payroll summary reports. The package also re-computes individual employee pay and/or payroll summaries.

Written in Integer Basic for simple, interactive, menu-driven, "turn-key" operation, the package executes from one Apple II diskette and retains results on secondary diskettes. The package is priced at $185 and is tailored to the user's state. For further information, contact NSP, Inc., P.O. Box 3092, Crofton, MD 21114; (301) 956-3476.

Circle No. 100

Master Catalog System for CP/M

A Master Catalog system that keeps track of all files on all diskettes in use is available on a Scotch brand single density diskette for CP/M users.

The system produces a listing of file names, in alphabetic order, with the name of the disk containing that file. Selective listings may also be made in a manner similar to that used by the CP/M DIR command. The SUBMIT command may be used to list directories of selected diskettes.

In addition to the Master Catalog system, the diskette has a program that sorts the directory on a diskette in alphabetic order and gets rid of non-ERAable files. Also included are two directory listing programs that list the directory in three or four columns with each file size and available space left on the disk.

Both source and object programs with instructions are included on the diskette for $10. For more information contact Elliam Associates, 24000 Bessemer St., Woodland Hills, CA 91367. *Circle No. 106*

Client Billing System

The Professional Client Billing System was designed by The Profit Group, a group of data processing professionals, to meet the billing requirements of various service related professions. The system was design to reduce the time required for the professional to produce client statements, thereby allowing more time for other required activities.

The system runs on the Hewlett-Packard HP-85 computer. This machine is completely self-contained, thereby making it very portable. The HP-85 was chosen for the billing system because of the many "built-in" features that most professionals require. In addition to the billing system, many custom programs can be developed to aid in other business areas.

Professional Client Billing System is implemented as a menu driven multi-program system. Loading and execution of the appropriate program is controlled by the system and does not require the user to remember several different commands to fully utilize the system. It is composed of seven separate programs: main system menu and current date entry routine, bill entry and editing, bill printing, payment entry, client data list, aging analysis of open bills and backup of client data.

The client/bill data files are not protected. This allows the user to create additional programs to use this data base if so desired. Price for the system is $400. For more information contact The Profit Group, 5 South La Grange Rd., La Grange, IL 60525; (312) 579-5599. *Circle No. 112*

Integrated Utility Package for TRS-80

Disk Keyplus is a collection of utilities that can be enabled directly from the keyboard of the TRS-80. Carefully designed to maximize ease of use, all Disk Keyplus routines may be turned on or off in just two key strokes.

Disk Keyplus supports auto-repeat, lowercase video (optional hardware modification required), restoration of lost Basic programs, single key stroke user definable strings, Basic shorthand, direct graphic character input and typewriter style input.

Disk based utilities include a routine that generates a previously defined string three different ways: at power up, during Keyplus initiation, or at the stroke of just two keys. More flexible than the DOS AUTO command, Disk Keyplus will execute any combination of commands and/or programs. Another routine allows users to initialize Disk Keyplus with any combination of utilities enabled or disabled.

Disk Keyplus may be used with either TRSDOS or NEWDOS. A cassette with both the 32K and 48K versions is available for $19.95. Non-disk Keyplus (Level 2, 16K) is available for $14.95. Pennsylvania residents add 6% sales tax. For more information contact SJW, Inc., P.O. Box 438, Huntingdon Valley, PA 19006; (215) 947-2057.

Circle No. 109

Time and Billing Software

Micro Information Systems has announced its professional time and billing software package called ESQ-1, designed to meet the requirements of small and medium-size law offices. It runs under the CP/M operating system (Versions 1.4 and 2.0) and is written in CBasic. The package requires 48K, a minimum of two disk drives and a printer.

The system was developed by a team of data processing professionals, CPAs and legal advisors over a two-year period for use by non-data processing personnel. It includes the application programs in object format, a 350-page docu-

mentation manual and a cassette training tape designed to step you through system operation.

The ESQ-1 software package consists of over 50 modular programs which enable you to perform entry and processing of time transactions, reimbursable costs, escrow transactions and accounts receivable records for all client/matters. The system enables you to create invoices selectively or automatically. It also features inquiry capabilities for immediate access to information plus numerous analytical reports which provide management information for improving productivity and profitability (e.g., pre-determined financial criteria, analysis of attorney time transactions by service code, etc.).

Passwords, security levels, batch total proofs, edit listings and input validation enhances auditability and system security.

A demonstration package, including documentation, is available for $75. Interested parties should send their request on company letterhead (specifying 8″ or 5-1/4″ version and type of terminal) along with a certified check or money order for $75 to Micro Information Systems, Inc., English Village Professional Center, North Wales, PA 19454; (215) 643-7350. *Circle No. 107*

Keyed File Support

Micro Applications Group has introduced MAGS AM IV, a high-performance version of its keyed file management system. This system combines the capabilities of MAGS AM III with the speed and performance of 8080 assembler, the company said. Access times are reduced up to 75% compared to previous versions of MAGS AM.

MAGS AM IV enables system developers to create programs that access data records quickly and directly by user defined keys. Secondary indexing with any number of keys allows access to data by all desired data elements. Real-time record and key deletion with automatic reclamation of free space conserves disk space while simplifying program development.

Records may be created randomly by key and sequentially by key, and updated by any of the retrieval methods. Key and record deletes may be performed randomly by key.

MAGS AM IV is provided with a subroutine to interface directly with CBasic programs. This allows MAGS AM IV to be intitiated by simple GOSUB statements, and maintains compatibility with previous versions of MAGS AM. It requires 8K of memory over that occupied by the operating system and the calling program.

Each package includes the MAGS AM file manager in pre-loaded and relocatable object code, MAGS AMX tutorial program, MAGS AMD file dump utility, user guide, reference card and one year update service. The 100 page user guide provides a description of the general principles and applications.

MAGS AM IV is available on standard eight inch and Micropolis Mod II diskette formats for $295. User Guide is $25 separately. For more information contact Micro Applications Group, 7300 Caldus Ave., Van Nuys, CA 91406; (213) 881-8076. *Circle No. 101*

WANTED:

BUSINESS PROGRAMS

Personal Computing readers want your business applications programs. Chances are, the software you've developed to solve your business problems will also help someone else faced with a similar problem.

Consider how your business benefits from your microcomputer — not only in the obvious areas of inventory, accounting and payroll, but in all departments and levels right up to the president's desk. Financial and marketing analysis, time management, planning, materials handling, product design and cost accounting are areas ripe for creative programming. Readers want help with all of these problems.

So why not share your solutions with our readers? Send us an article describing the problem you faced and how you used your microcomputer to solve it. Be sure to include a program description, program listing and sample run.

Remember, readers aren't familiar with your program. So explain in detail what the program does and how it does it. Include here the overall structure of your program as well as any special algorithms or routines you've used. Give suggestions for modifying or expanding the program for other applications, other businesses or other situations.

All submissions should be original, typed (not all CAPS), double-spaced and neat. Include your name and address on the first page of the article and enclose a self-addressed, stamped envelope for return of material. Also, please use a fresh ribbon on your printer for program listings and sample runs.

Feel free to call us at (617) 232-5470 if you have any questions or want to discuss specific article ideas.

Mail your manuscript to:

Don Wood, Managing Editor
Personal Computing
1050 Commonwealth Ave.
Boston, MA 02215

WHAT'S COMING UP

TRS-80 Editor, Assembler, Debugger Package

Microsoft Consumer Products announced Editor/Assembler-Plus, an editing, assembling and debugging package for the TRS-80. In addition to providing every feature of both Radio Shack's Editor/Assembler and T-Bug in one package, this cassette-based software has features previously available only on large computers, to make working in assembly language easier and faster.

Assembler features include the ability to assemble directly into memory, conditional assembly and macro facility. Direct assembly allows you to bypass the previous cumbersome process of saving object code on cassette tape and then loading it into memory for execution. The conditional assembly feature allows the assembly of code if a given condition is true; it is especially useful for generating different versions of a program.

Expression evaluation, automatic origin, improved symbol table, printout and quash command are among the other Assembler enhancements that Editor/Assembler-Plus provides. It also includes the powerful Z-Bug debugger so a separate debugger isn't necessary. It addition to all Radio Shack T-Bug features, Z-Bug allows the programmer to use up to eight breakpoints at a time with no need to remove a breakpoint before proceeding. Z-Bug also has single-step execution, direct execution in calculator mode, symbolic references and many more features.

Editor/Assembler-Plus expands editing capabilities with convenient new commands such as MOVE and COPY, SUBSTITUTE, EXTEND, EDIT (range) and FIND (range).

Microsoft Editor/Assembler-Plus runs on any TRS-80 with Level II Basic and a minimum of 16K RAM. The package includes cassette tape, 110-page reference manual and complete, easy-to-use reference card. It's suggested retail price is $29.95. For more information contact Microsoft Consumer Product, 10800 Northeast Eighth, Suite 819, Bellevue, WA 98004; (206) 454-1315. *Circle No. 115*

TRS-80 Accounts Receivable

Radio Shack has produced a balance forward system, "Accounts Receivable," available for use on the Model I TRS-80 microcomputer system. The software provides end-of-month billing, statements ready for mailing, automatic customer record updating, totals for general ledger posting, optional message lines on billing statements and full accounts receivable analysis including activity status.

In addition, the system is designed for late charges on unpaid accounts, and can be set up to allow revolving credit with a percentage of the outstanding balance due each month.

A Model I TRS-80 Level II system with 16K RAM, at least an 80 column printer, such as the Radio Shack Line Printer I or II with appropriate cable and a minimum of two disk drives are required to use this software package.

With a two disk system either 300 accounts and 1000 transactions per month, or 100 accounts and 2000 transactions per month can be handled. With a three disk system up to 500 accounts and 2500 transactions per month can be handled.

Reports printed by the systems are: complete transaction file report, general ledger recap report, complete account listing, account listing by activity status, accounts receivable analysis by activity status and posting report.

The software price of $149.95 includes program diskette, blank data diskette and instruction manual. It is available from Radio Shack stores, dealers and computer centers.

Prices for a complete TRS-80 microcomputer system capable of running the Accounts Receivable System start at under $4000. For more information contact Radio Shack, 1300 One Tandy Center, Fort Worth, TX 76102; (817) 390-3272. *Circle No. 142*

Z-80 SoftCard

Microsoft Consumer Products has announced the Z-80 SoftCard, a new plug-in processor for the Apple II that allows the Apple to run software written for Z-80 based computers.

In addition to the plug-in card, the SoftCard package includes the two most widely used microcomputer system software packages, the CP/M operating system and Microsoft Disk Basic, ready to run on the Apple II.

The SoftCard allows the user to use either the Apple's 6502 processor or the Z-80 processor as needed to run a program. A command is used to switch between the two processors. The SoftCard is compatible with existing Apple software and peripherals.

Versions of Microsoft's Fortran, Cobol and Basic Compiler for the Apple II with Z-80 SoftCard will be available separately. In addition, CP/M applications software written for Z-80 based computers can be converted to run on the Apple with minimal alteration.

Among the features that Version 5.0 of Microsoft Basic adds to Applesoft are: PRINT USING for formatted output, long variable names, random disk I/O with variable length records, WHILE/WEND conditional statement, 16-digit precision, and AUTO and RENUM for numbering and renumbering lines. Graphic capabilities are expanded with the graphics statements LINE, PUT and GET, which have been added to Version 5.0 as a special Apple feature.

The Z-80 SoftCard will run on all configurations of the Apple from the standard Apple II to the Apple II Plus with Language Card. No hardware or software modifications of any kind are required to install the SoftCard. It plugs into any of the Apple's slots except slot 0 and does not affect operation of the Apple II when not in Z-80 mode. The Z-80 processor runs at an effective clock rate of 2 Mhz. The Z-80 SoftCard with CP/M and Microsoft Basic will run on the Apple II with 48K RAM and single disk drive. The package includes the card, CP/M and Basic on diskette and full documentation.

Suggested retail price for the Z-80 SoftCard with Microsoft Basic and CP/M is $349. For more information contact Microsoft Consumer Products, 10800 Northeast Eighth, Suite 507, Bellevue, WA 98004; (206) 454-1315. *Circle No. 121*

Inventory Control System

Structured Systems Group announced an inventory control software package for small to medium businesses. Able to support up to 32,767 inventory item records, this system provides information on the quantity, value and activity of inventory items.

The Inventory Control System provides access to file records by item number allowing timely management information and prompt customer service. The system includes a special "auditability option" to create an ongoing hardcopy record of either stock additions, stock depletions, or both. The hardcopy proof simplifies the task of correcting errors caused by incorrect data entry.

The system generates informative reports for management convenience, including ITEM LIST, details the quantity price and status of items in inventory; STOCK ACTIVITY REPORT, details the activity (additions and deletions) of any selected range of items for the current period or period to date; STOCK VALUATION REPORT, gives the average value of each stock item, its replacement cost, retail price, stockroom quantity, stockroom value, and the total inventory value for all items in the report; REORDER REPORT, displays out-of-stock items, items below reorder point or items on order.

The Inventory Control system requires CB2, and will run on most CP/M microcomputer system with dual floppy disk drives and 48K of user memory. For more information contact Structured Systems Group, 5204 Claremont Ave., Oakland, CA 94618; (415) 547-1567. *Circle No. 118*

TRS-80 Model-II Software

Microsoft has announced TRSDOS-compatible versions of their Cobol and Basic compilers for the TRS-80 Model II microcomputer. Both compilers provide complete facilities for commercial or in-house software development including Microsoft's standard macro assembler and linking loader. The relocatable object code produced by the compilers may be resold, transported to other Model-IIs or built into turnkey systems.

The Cobol-80 compiler is an ANSI-74 implementation of Cobol, featuring complete interactive screen handling capability using ACCEPT and DISPLAY, indexed and relative files, and an optional packed decimal format that reduces mass storage requirements. Cobol-80 also supports advance data manipulation verbs (COMPUTE, INSPECT, STRING, UNSTRING, SEARCH), three-dimensional arrays and a full COPY facility.

The Basic compiler produces highly optimized object code that runs 3 to 10 times faster than interpreted Basic programs. All Microsoft Basic lan-

guage features are supported, including WHILE/WEND conditionals, calling of assembly language subroutines, trace facilities, PEEK/POKE directly to memory locations, long variable names, variable length records in disk files, RANDOMIZE, error trapping and nested IF/THEN/ELSE. The Basic compiler is also available in a version for the TRS-80 Model I computer.

Prices are $395 for Basic compiler, and $750 for Cobol-80 compiler. For more information contact Microsoft, 10800 Northeast Eighth, Suite 819, Bellevue, WA 98004; (206) 455-8080. *Circle No. 133*

Buffering Code for CP/M

Conceptual Systems' buffering code allows users to allocate paging buffers for use by CP/M.

All sectors being accessed are paged in and out of the allocated buffer space with a "Least Recently Used" algorithm. Depending on the type of I/O being performed, this can drastically reduce the physical number of I/Os occurring on the disk — for example, when random I/O is being done on medium to large files, especially from Basic where extents of the file are constantly being opened and closed.

The code also contains an integral sort callable from any language running under standard CP/M. The sort allows fast in-core sorting (2000 records in under 5 seconds). Standard 8″ or mini 5-1/4″ diskettes are priced at $47.

For more information contact Conceptual Systems, Inc., P.O. Box 58452, Houston, TX 77058; (713) 488-7708. *Circle No. 134*

Dental Management System Software

CalData's DentalWare is a self-contained series of programs for modern dental practices. Features include : patient personal, financial and insurance recordkeeping; treatment plans and work history; details of patient treatment; individual and family accounts; re-call and delinquent notices; fully itemized statements; password access to various commands; insurance forms; installment and balance-due billing; series of reports including appointments list; word processing capability.

DentalWare features a "self-customizing" program allowing statements, notices and charges to be defined.

Package includes 10 diskettes, 3 user's manuals and 3 self-instruction packets. Price is $2600, currently available for use on TRS-80 Model II. Available separately are User's Manual (120 pages) at $35 each and Word Processor-Word Magic II at $100 each. For more information contact CalData Systems, P.O. Box 178446, San Diego, CA 92117. *Circle No. 127*

CLASSIFIED

CP/M Word Processing System

Spellbinder, a word processing system from California Pacific Computer Company, features automatic word wrap, print formatting, proportional spacing, screen editing, justification, block text manipulation, insertion, deletion, typeovers, search and replace, emphasis/special character treatment, full mailing list/mailing label plus sort/merge and text/merge capacity, and legal numbering.

Macro Program modules perform a complete mail room operation. The Mail-Sort Macro Program can sort a master mailing list into several lists for specific target mailing. Once the mailing list is created, the Mail-Merge Macro Program will write a personalized letter to each name on the list. From the mailing list the program will insert information (such as the first name) to individualize the letter.

Macro Programming allows Spellbinder to type a letter in the style of almost any business, said the company. For example, legal documents require a different scheme for pagination and running heads than do most other business documents. The lawyer-oriented Macro Program prints to these requirements and also numbers the lines of legal texts. Spellbinder operators can easily write Macro Programs to fit individual typing needs.

Spellbinder is available in the following formats: IBM 8″ single density; Northstar double density; Micropolis quad density; Heath WH89; and Cromemco. Spellbinder is written in 8080 assembly language for fast operation and is designed to run under CP/M.

For more information contact California Pacific Computer Company, 2601 Blackburn, Davis, CA 95616; (916) 756-2921. *Circle No. 130*

Matrix Package for Pet/CBM

Matric, an array handling package is a 5K assembler language program to expand Commodore Basic with fourteen new statements. Variations lead to more than 25 distinct operations.

A single Matric statement displays a matrix on the screen; the values on the screen can be changed and entered into memory. Statements transfer data between matrices, fill a matrix with a constant, transpose matrices, transfer diagonals between matrices, from a matrix to a vector, from a vector to a matrix, or fills a diagonal with a constant. Other statements give vector and matrix addition, subtraction, multiplication; and elementwise multiplication, division, squares and square roots. One statement inverts matrices, and the absolute value of the determinant can be obtained. Another statement computes eigenvalues and eigenvectors for symmetric matrices.

All statements can be used in Basic programs, and can be entered interactively as direct commands.

Matric's algebraic style statements involve array names and operator symbols. Indexing, orienting of vectors and conversions between integer and floating point are automatic. The program speeds past the Basic interpreter during handling of arrays. Computations call on the precise arithmetic subroutines stored in Pet/CBM permanent memory.

Matric works with integer arrays as well as floating point arrays permitting space savings when storing data.

The program comes on tape or disk with a 32-page manual. Versions are available for 8K, 16K and 32K machines, old and new ROMs. Price is $125. For more information contact Cognitive Products, P.O. Box 2592, Chapel Hill, NC 27514.
Circle No. 136

Adventure Game for Kim-1

Aresco announced Kim-Venture, an adventure game for use on a standard 1K Kim-1 microcomputer. The package contains a Kim cassette, a 32-page operator's manual and three pages of player instructions.

Program listings, operational notes, Kim memory map, a map of the caves, scoring procedures, and instructions for reloading the program to resume play after an interruption are all included in the Operator's Manual.

Kim-Venture is available for $24.95. MC/VISA/C.O.D. are accepted. For more information contact Aresco, Inc., P.O. Box 1142, Columbia, MD 21044; (301) 730-5186.

Circle No. 103

COMPLEMENTS

CRT Turntable

Computer Furniture & Accessories has added a turntable for CRTs to their line of terminal stands, micro shelf desks and rack mount enclosures.

Turntables offer easy access to the CRT by two or more people, and are available for immediate delivery in walnut, size 24 × 16. Price is $59.95.

For more information contact Computer Furniture & Accessories, Inc., 1441 West 132 St., Gardena, CA 90249; (213) 327-7710. *Circle No. 151*

Apple Cart and Apple Locker

Tele-Terminals, Inc., has announced Apple Cart to store your Apple computer, and an Apple locker to prevent theft of your valuable equipment.

The cart stores an Apple II, one or two disks drives and monitor and has additional shelf space for game pad-

dles, manuals and other items. The stand is made of heavy duty metal painted a crinkle black. It has a concealed shelf to put manuals or other items for storage. Casters allow easy and versatile movement of the stand. Shelf many be detached if desired by two thumb screws.

Apple Locker is your measure of prevention against theft. It is a security locking device designed to discourage any would-be thief from taking the en-

tire computer, two disk drives, monitor and boards (or any combination of Apple and three devices). It comes complete with locks, connectors, cable and diagrams for installation (approximately 45 minutes).

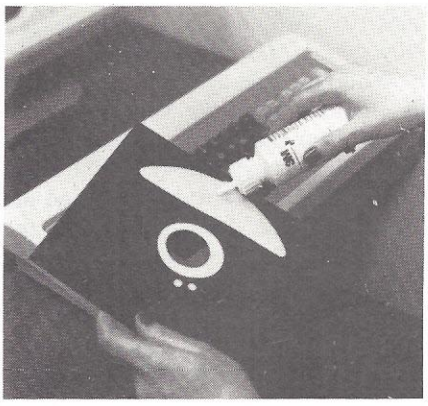
Apple Cart sells for $169.95 and Apple Locker is priced at $69.95. For more information contact Tele-Terminals, Inc., 7216 Boone Avenue North, Brooklyn Park, MN 55428; (612) 535-5330, National WATS (800) 328-3072, MN WATS (800) 442-3006.
Circle No. 148

Head Cleaning Diskettes

Cleaning kits for diskette heads, which aid in achieving fewer system interrruptions and losses of data, are available from 3M's Data Recording Products Division.

Scotch Head Cleaning Diskettes use a wet-and-dry method in which a cleaning solution is applied to the porous cleaning fabric in the diskette envelope. The cleaning diskette is then run in a normal manner for 30 seconds. Two-sided systems may be cleaned with the same technique.

Each kit comprises two diskettes and a bottle of fluid, quantities recommended for a maximum of 30 cleanings (15 per diskette). Available through 3M Data Recording Products distributors, a kit carries a suggested list price of $30. Two cleaning diskette sizes are available; Scotch 7400 kits contain the 8-inch size and Scotch 7440 kits contain the 5-1/2-inch (mini) size.



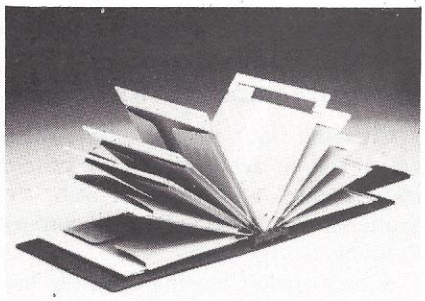
For more information contact 3M, Department DR80-1, Box 33600, St. Paul, MN 55133; (612) 733-9572.
Circle No. 113

WHAT'S COMING UP

Mini Diskette Fan File

A new addition to the Eichner range of storage and retrieval systems is the Mini Diskette Fan File housing 20 minidiskettes in double sided pockets.

The pockets are made of anti-static material, and store the minidiskettes securely and free from pressure. They sit in the Fan File on "floating axles" which cushion the pockets if the file is moved or dropped. Also featured is a patented indexing system for retrieval and replacement.



The price for the file is $39. For more information contact Eichner Systems, Inc., 1460 Industrial Dr., Itasca, IL 60143; (312) 773-1881. *Circle No. 119*

Studio II Accessories

Aresco announces the release of its line of Studio II Conversion Packages, designed to allow the owner of an RCA Studio II video game to convert his game unit into a microcomputer.

The package consists of a PROM card, a RAM card and a Backplane card; all the instructions necessary to install and operate the unit, and six issues of Aresco's Studio II User's Newsletter, *MicroStudio News*.

While the package is not completely assembled, very little work is required to get it up and running, the company said. The backplane plugs into the Studio II game cartridge slot, and the PROM and RAM cards plug into the backplane. The four connectors on the backplane are mounted but not soldered. The PROM and RAM cards are completely assembled (except for two 2114 RAM ICs), tested and guaranteed against defects in workmanship. Two signals must be brought out from the Studio II for the RAM card, and instructions are provided for all the work that must be done.

WHAT'S COMING UP

The package provides 1560 bytes of RAM, 512 bytes of ROM and includes the pre-programmed PROM containing the Monitor program. The newsletter, *MicroStudio News,* contains information pertaining to the Studio II Interpreter, game programs written by users and cassette I/O designs.

Price for the package is $160. MC/VISA/C.O.D. orders are accepted by telephone. For more information contact Aresco, PO Box 1142, Columbia, MD 21044; (301) 730-5186.

Circle No. 116

WHAT'S COMING UP

Hardware Module

A hardware module specifically designed for micro-computer systems called CompuDesk, features a split-level top for elbow-height CRT operation and eye-level-while-sitting, waist-level-while-standing printer height. Module design helps reduce operator fatigue and offers convenient, arm's-reach packaging of up to five hardware pieces.

CompuDesk has two adjustable shelves and a self-closing door with an attached storage rack for manuals and magazines. Convection venting cools the shelf area with a power fan available for unusually high-heat systems.

Constructed of birch plywood with walnut stain finish and Formica tops, the module sells for $359, plus freight and a $25 packaging charge as applicable. For more information contact Mark Moore, ComputerGoods, P.O. Box 2635, Eugene, OR 97402; (503) 687-2387. *Circle No. 154*

8-Inch Disk Saver Kit

Floppy Saver, now available for 8" floppy disks, is a 7-mil mylar reinforcing ring which, when applied to the center hole of the disk, will save a disk already damaged and will protect a new disk for many times normal life. The kit consists of an installation tool and 25 7-mil mylar rings. Refill kits without the tool are also available. Retail price for the kit is $14.95 with refills costing $7.95. For more information contact

ADVERTISERS' INDEX

SALES OFFICES

- **Northeast**: Arlene Joseph, Benwill Publishing Corp., c/o Morgan-Grampian, Inc., 2 Park Ave., New York, NY 10016; (212) 340-9780.
- **California**: Michael Reynolds, 924 Westwood Blvd., Los Angeles, CA 90024; (213) 478-3017.
- **Japan**: K. Yanigihara, International Business Corp., 10-10 Shinjuku 3-chome, Shinjuku-ku, Tokyo, 160 Japan; (03) 350-0272.

Tri-Star Corporation, PO Box 1727, Grand Junction, CO 81502; (303) 243-5200. *Circle No. 200*

Reset Button Extender

The Reset Extender is a device that will help TRS-80 owners who are having trouble accessing the little Reset button in the back of the keyboard after adding an expansion interface.

According to the developers, many TRS-80 users are currently sticking a pencil through the hole in the expansion interface connector hood to get to the RESET button. This simple addition to the connector hood installs in seconds; just snap the grommet into the hood as shown in the instructions.

Non-expansion interface users can also use the Reset Extender by drilling a 1/8 inch hole in the "hatch" cover and discarding the grommet (or save it for later expansion).

Reset Extender, complete with push button, spring, grommet, rivet and instructions, is priced at $3.99. For more information contact Emmanuel B. Garcia Jr. & Associates, 203 N. Wabash, Rm 2102, Chicago, IL 60601; (312) 782-9750. *Circle No. 197*

Continuous Business Forms

Alpha Supply Company, manufacturer and distributor of data processing supplies and accessories, has expanded its line of continuous business forms.

Alpha forms now include billing and statement forms, letterhead, and checks for payables and payroll. In addition, Alpha professional forms for the legal office include legal cap, ruled and numbered pleading and 14-inch contract papers.

A free brochure describing the forms and form samples are available from Alpha Supply Company, 9625 Mason Ave., Chatsworth, CA 91311; (213) 882-9818. *Circle No. 194*

LITERATURE

Business Basic Brochure

A new brochure describing use, adaptability, flexibility and compatibility of the Business Basic programming language has been published by Data General.

"How You Use Your System Is Your Business," explains how Business Basic can be tailored to the individual needs of each customer's business on any Nova, microNova, or Eclipse computer system.

This document, number 012-853, is available from Data General Corporation, Communications Services, Mail Stop B-32, 4400 Computer Drive, Westboro, MA 01580. *Circle No. 188*

Computer Supplies Catalog

A 36-page color catalog illustrating an expanded line of computer supplies has been issued by Uarco Incorporated.

Offering more than 500 computer-related items, the catalog features magnetic media, word processing supplies, printer ribbons and programming aids. It also displays CRT work stations and binder storage systems, as well as stock computer forms and continuous pressure sensitive labels.

The catalog is free on request. For more informaiton contact Uarco Computer Supplies, Free Catalog Department, West County Line Road, Barrington, IL 60010; (312) 381-7000. *Circle No. 185*

Training Your Computer

A hands-on guide to learning programming in Basic called "Training Your Computer" is available in TRS-80, Apple and Pet editions.

The booklet leads beginners through standard programming techniques in short programs that are typed into the computer.

Price is $3.75. For more information contact Metra Instruments, Inc., Pickering Division, 2056 Bering Drive, San Jose, CA 95131; (408) 297-8530. *Circle No. 182*

Computer-Oriented Bibliography

After seven years of relatively stable output, the number of new computer books increased 25 percent last year. More than 250 books were published, all are listed in the 13th Edition of the "Annual Bibliography of Computer-Oriented Books," released by the University of Colorado.

Accompanying the increase in quantity was an increase in the quality of books, particularly in the area of advanced programming (19 new books), according to the University's Computing Newsletter. The section now contains a total of 58 books. Harlan Mill's new book *Structured Programming* is an example of the high quality of the new books, as is *The Art of Software Testing* by Glen Myers.

Of 18 new books on data processing management, three concentrate on software project management. The section on distributed systems increased over 50%. While there was a surprising decline in new books in the application areas (only 20), the increase in books on microcomputers and personal computing (14) will hardly be a surprise to anyone.

All introductory-type books published prior to 1975 were deleted. The bibliography still contains more than 1000 books from over 150 publishers. It separates the books into 55 categories and catalogs them according to type (reference, textbook, handbook) and style of presentation.

Copies of the bibliography are available for $4. For more information contact Computing Newsletter, Box 7345, Colorado Springs, CO 80933. *Circle No. 191*

Catalog of Computer Books

Camelot Publishing Company's 32 page catalog details their computer science books, materials and teaching aids. Over 50 items are described for use by teachers, students and computer hobbyists.

The catalog is available free of charge. For more information contact Camelot Publishing Company, P.O. Box 1357, Ormond Beach, FL 32074. *Circle No. 110*

Selling Lobo Drives Disk Memory Systems makes a lot of 'cents'.

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